THE METAL INDUSTRY
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SILVER ORNAMENTATION OF FOUNTAIN PENS.

By George B. Hogaboom.

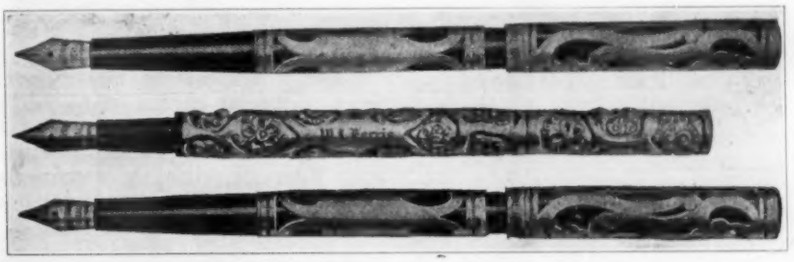
There is no metallic ornamentation which permits of a wider range of design than that of a deposited metal decoration.

While great care must be used in the preparation of a pen, the operation is very simple and requires only a few trials for a plater to become proficient. In this article the operations will be given in detail.

The pens, being made of hollow rubber or celluloid, must have something to hold them steady in the solution. This is accomplished by making a rack as follows:

THE RACK—FIG. 1.

Take a bar of metal about ½ inch square. Brass is preferred as it can be readily cleaned by running through a bright dip, and drill holes through it with a No. 8 standard drill ½ inch from the center of one hole to the center of the next one. On the side of the bar drill holes, of the same size, through to the other holes. Cut a thread in these holes with a standard-size tap and fit a screw to each, 14-24 tap and 14-24 ½-inch screws being used. The length of the rack depends upon the length of the plating tank. Fourteen inches is a convenient length as it permits of the handling of 25 pens at one time.



FILIGREE AND SOLID SILVER DEPOSIT WORK.

WIRING—FIG. 2.

Through a cork that will fit tightly into the pen, force a piece of brass wire (No. 17 soft brass) six inches in length. Loop the end of the wire so that the cork cannot slip off.

HOLDERS.

Drill holes the size of the brass wire one inch deep, one inch apart, in a board two inches thick. On this board the pens can be stood upright without touching one another.

THE BRONZE POWDER.

Bronze powder is preferable to graphite in that it covers more rapidly in the silver solution and gives less trouble, and therefore better results. A great deal of trouble is often found in using ordinary bronze powder from the fact that it often contains grease which has been added by the manufacturer to aid the process of reducing the metal to a fine impalpable powder. That kind is not suitable for plating and it is necessary to get powder that is free from all grease or burn the grease out with bisulphide of carbon or any other substance which does not give any great reducing heat.

THE SIZING.

Dissolve in benzole as much French copal as it is capable of taking up. Decant off the solution and pass through a cheesecloth filter to remove all particles of dirt, and then dilute with benzole so that it will flow freely and yet leave a good, tacky body. Keep the solution clean, as any foreign substance will prevent the bronze powder from adhering.

MERCURY DIP.

Take ¼ ounce of yellow oxide of mercury and 4 ounces of cyanide of potassium and dissolve in each gallon of water that is required to make a solution large enough so that an entire rack of pens can be dipped at once. This dip will be found to give good results as it gives up the metal freely and can be strengthened from time to time by the addition of more oxide of mercury.

PLATING SOLUTION.

As a heavy deposit is required a solution rich in silver gives the best results. Too much free cyanide must not be used as it may dissolve the bronze powder off the pens. Six ounces of silver, reduced to either a chloride or a cyanide, and ten ounces of cyanide of potassium used to each gallon of water will give satisfactory results.

THE ANODES.

The depth of the anodes in the solution must not exceed the depth of the pens. If they do it will be found that the cap, or the lower part of the pen, will receive a heavier deposit than the barrel. An anode about three-fourths as wide as the pens are long will give an even

deposit on the entire pen. Plenty of anode surface must be used so as not to impoverish the solution. A thick anode will last longer in solution without decreasing in width.

NICKING.

On the top of the cap and on the barrel of the pen small lines should be cut in with a sharp single cut engraving tool. The depth must be moderate so that the marks can be polished out of the deposited metal. This is to prevent the metal covering from turning or becoming loose on the pen.

THE OPERATION.

Place the cap of the pen on the bottom of the barrel. Into the top of the pen firmly push the wired cork so that the pen can be handled by the wire without falling off.

Take a Mason fruit jar, or any glass jar with a wide mouth, and fill it with the sizing solution. Dip your pen into this, allow to drip well and then stand up in the holder. When the excess of the solvent has evaporated and the surface of the pen is still tacky brush it with the bronze powder thoroughly. A good quality sash tool is a handy brush to use. Rub the powder in well and, after brushing the surplus powder off, polish with a camel's hair brush shaped like a plater's long-handled scouring

FIG. 1. RACK.

brush. Lay the bronzed pens in layers in a tray, placing a sheet of tissue paper between each layer. Allow the pens to dry five or six hours, or, better still, prepare a batch of pens the day previous to the plating of them.

For a connection, wind one end of a piece of copper wire securely around the brass wire close to the cork and the other end around the top of the pen, taking care not to extend down the pen too low so that when the wire is removed it will not mar the principal part of the deposit. Fasten the pens in the rack evenly, leaving the end holes for the wire to hang the rack onto the cathode rod. The pens are now ready for the solution. Rinse the rack of pens off with running water to remove whatever loose bronze powder may be left thereon.

Dip the pens into the mercury dip, rinse again in a tub of clean water and then place them in the plating solution. Use the clamp (Fig. 3) to hold the rack steady in the solution. It is best to have the current turned on so that the action of the plating will commence immediately.

A strike may be used after the mercury dip if so desired, but it is not necessary and often a decided disadvantage. When the bronze powder is first wet with a cyanide solution it becomes very soft and granular and the slightest jar will rub it off, and it will be found the less it is handled the better. So when a strike is employed great care must be used in removing the rack from one solution to the other so as not to rub off any of the bronze powder and thus render all the previous operations useless.

To determine the thickness of the deposit, suspend in the solution a narrow piece of brass the same depth as of the pens. If the thickness of the brass has been measured on a gauge it can be removed from the solution from time to time to determine the thickness of the deposit on the pens. The pens are now sent to the polishing room. A smooth surface is all that is required, as the engraving will hide all the uneven places. They are now prepared for etching. Although this is not strictly in the plater's line he is often called upon to do it and a knowledge of it proves valuable.

After the polished pens have been thoroughly washed in soap and water to which ammonia has been added, they are dipped into a weak nitric acid solution and then passed through boiling water and dried on a cloth. This not only cleanses them but gives the pen a coating which is easy for the decorator to mark upon and insures the adherence of the paint. The design is painted on with some good asphaltum paint, placed in the holders and allowed to dry. It is well to connect the barrel and the cap of the pen with a narrow band as this gives a good connection if the etching is done by electricity.

There are two ways of etching pens: either with the aid of electricity, or by placing them in nitric acid which stands from 20 degs. to 24 degs. Be. If electricity is preferred it is necessary to construct a special apparatus to obtain the best results. Reverse current is used, the pens being used as the anodes.

FIG. 2. WIRING.

FIG. 3. CLAMP.

Take a round stone jar of the required capacity and bend a piece of aluminum so that it will fit inside of the jar, the width being about three-fourths the length of the pens. Rivet this sheet together, and on the edge, at even intervals, rivet three flanges about one inch wide and eight inches long. Use aluminum rivets. Shape a brass bar one-quarter inch thick and one inch wide, around the outside of the jar; to this rivet the aluminum flanges and then solder a regular connection for the cathode rod. Wind around this bar several thicknesses of insulating tape so that the drip from the solution will not corrode the connections. For the anode rod take a square brass bar and drill holes through it the same size as the brass wire which holds the pens, about one inch apart. The solution is made by diluting nitric acid to 5 or 8 degs. Be.

Bend the wires of the pens like hooks and fill the rod; turn on the current and as fast as one pen is etched replace it with another. Upon the strength of the current depends the length of the operation. The solution will become warm after using a while, and the heat will affect the asphaltum paint. Replace this with another solution, allowing the first solution to cool, and use it when the other one becomes warm. When the solution becomes saturated with metal the operation becomes slow. It is then replaced with a new one, and the silver is precipitated and used to replenish the plating solutions or refined.

After etching, wash in benzine, remove the corks and rinse off in soap and water. The cap and the barrel are separated, the edges trimmed and polished and then sent to the engravers, after which they are highly polished and cleaned. If the rubber of the pens has become dulled they are polished with paraffine on a cotton buff. If they have become discolored an application of bi-sulphide of carbon will restore the color.

THE PATENT CONTROVERSY OVER BEARING METALS.

Considerable time and money has been spent in litigation over the validity of patents which had been issued to The Ajax Metal Company of Philadelphia, Pa., covering the production of certain copper-tin-lead bearing metal known as plastic bronze. The original patent was granted in 1900 to G. H. Clamer and Joseph B. Hendrickson, assignors to the Ajax Metal Company, Philadelphia, Pa.

Basing their operations on this patent The Ajax Metal Company brought suit against the Brady Brass Company Jersey City, N. J., for infringement. The details of the controversy are given by G. H. Clamer* in a paper read before the American Foundrymen's Convention held in Cincinnati, Ohio, May 17-22, 1909.

In connection with the above we publish an interesting letter from A. Allan & Sons, New York, who are manufacturers of an anti-friction metal for bearings, piston rods and valve stems, etc., known as "Allan Metal."

PATENTS ON BEARING METALS.

By Andrew Allan, Jr.†

A paper of Mr. C. H. Clamer, of The Ajax Metal Co., Philadelphia, Pa., on "The Patent Situation in the United States Respecting Alloys," was read by Dr. F. T. F. Stephenson before the Foundrymen's Convention at Cincinnati, Ohio, May 19, 1909. To me, this paper does not appear to be a discussion on the title chosen, but rather an epitome of their own personal situation. I believe Mr. C. H. Clamer claims letters patent on alloys containing under 7 per cent. tin and over 20 per cent. lead, balance copper. To grant a patent on such alloys as late as 1900 to me seems absurd. The art of producing bearing metals, containing under 7 per cent. tin, and over 20 per cent. lead, balance copper, was pursued long before the time claimed for patent rights by Mr. C. H. Clamer and his associate.

Long before Mr. C. H. Clamer and others tried to raise the lead percentage in copper-tin-lead alloys, Andrew Allan, Sr., of New York, invented a secret process by which copper and lead may be alloyed in any proportion with or without the use of tin and a perfectly homogeneous mixture obtained. Castings weighing one thousand pounds and over can be produced without the slightest signs of segregation. It is generally believed that a certain per cent. of tin is necessary to assist in keeping the copper and lead homogeneously mixed. This is not the case. The introduction of tin into the alloy has no bearing whatever on keeping the lead from segregating from the mix, but rather to harden the alloy and thus reduce proportionally its anti-friction and wearing qualities.

The art of amalgamating copper and lead in any desired proportion with or without tin, was invented by Andrew Allan, Sr., in 1876; but it was not until fifteen years later (1891) that he started to place various alloys on the market under the name of Allan's Red Anti-friction Metals or Allan Metals. Starting on a small scale, he had to contend with many difficulties in introducing these alloys, but when their real merits became generally known by the engineering profession, the desired position among the bearing metals was soon gained for them. Large quantities of these metals were sold throughout the United States prior to 1900; tons were sold in Philadelphia prior to said date, and bearing metal manufacturers were generally aware of their existence.

For years Andrew Allan, Sr., has claimed that no other metallurgist has mastered the art of amalgamating copper and lead with or without tin, and not until they can produce castings as illustrated, of alloys of copper and lead in any proportion, with or without tin, and have same homogeneously mixed, without the slightest sign of segregation, have they the right to claim to be masters of the art.

Figure No. 1 shows filling mill pinion bearings; these bearings take 1,000 pounds of metal to the cast. Figure No. 2 shows a bushing for a guide bearing on an 8,000 KW. Curtiss steam turbine. Figure No. 3 shows a lot of bushings for metallic piston rod packings. All of these casts are homogeneously mixed with not the slightest sign of segregation.

FIG. 1. FILLING MILL BEARING PINIONS.

The claim may arise that Andrew Allan, Sr., is not, or has not been manufacturing a copper-tin-lead alloy. True, most of his formulas do not contain tin. This does not affect the case; if the patent in question is legal, then Allan Metals are infringements on said patent, as they contain less than 7 per cent. tin, and over 20 per cent. lead, balance copper. "One object of the patent in question is to fill a recognized want and provide an alloy for journal bearings which shall hold up within itself more lead than was heretofore possible without the use of nickel." Andrew Allan, Sr., has been meeting these conditions for the past eighteen years.

He learned from experience that tin, nickel or other metals added to the lead-copper mixture, were quite injurious to the anti-friction and wearing qualities of the lead, and without raising the melting point rendered the mixture hard and brittle and not adapted for high-grade service, such as facing locomotive, marine and stationary engine steam pistons, piston rod packings for superheated service, bearings for mill pinions, rolling mill and

*Secretary Ajax Metal Company.
†A. Allan & Son, manufacturers of Allan Metal, New York.

central station engines, etc. Tin especially, because of its adhesive qualities, he found to be a very undesirable element in these alloys, when a high-grade anti-friction metal was wanted. This reply to Mr. C. H. Clamer's paper is by no means prompted by malice. Its motives are to correct a false impression and to give credit where credit belongs for the invention of this art.

PAPER BY MR. CLAMER.

Mr. Clamer's paper was entitled "The Patent Situation in the United States" and said in part:

In 1900 a patent was granted to the writer and J. G. Hendrickson for such a series of copper-tin-lead alloys in which the tin was below 7 per cent., the lead above 20 per cent. and the balance substantially copper.

In the early days of railroading, copper and tin alloys were considered the standard mixtures for railway bearings. At first, alloys so high in tin as bell-metal (i. e., tin 15 per cent. to 20 per cent.) were used. This alloy was employed under the supposition that the harder the alloy, the more wear resisting were its properties. Such bearings were also recommended because of the well-known fact that hard bodies move upon each other with less friction than softer ones. It was soon found, however, that these hard bearings gave considerable trouble. They were not sufficiently yielding or plastic to adapt themselves to the irregularities of the service; also excessive heating and gripment soon took place. Alloys were then made with lower tin content: first, with 12½ per cent. tin and finally with 10 per cent. Bearings containing 10 per cent. tin and 90 per cent. copper remained the standard for a great many years, first, without the present almost universal practice of using lead linings, and after about the year 1870, with lead linings. It was about this year that patents were granted to Mr. D. H. Hopkins for attaching to bearings a thin lining of soft metal; the object being to make the bearings, as described in the patent specification, self-fitting, the thin lining of this soft metal making it possible for the bearing soon to conform to the journal giving it, as it were, an automatic seat. The advantage to be derived from this invention was at once apparent, and the success of lead lined bearings was phenomenal, as railroads were quick to adopt them. The patents of Mr. Hopkins were declared valid by both the Eastern & Western Railroad Association and as a consequence, Mr. Hopkins for quite a period of time enjoyed almost a monopoly of the journal bearing business of this country. Mr. Hopkins during all this period adhered strictly to the copper and tin alloy for his bearings.

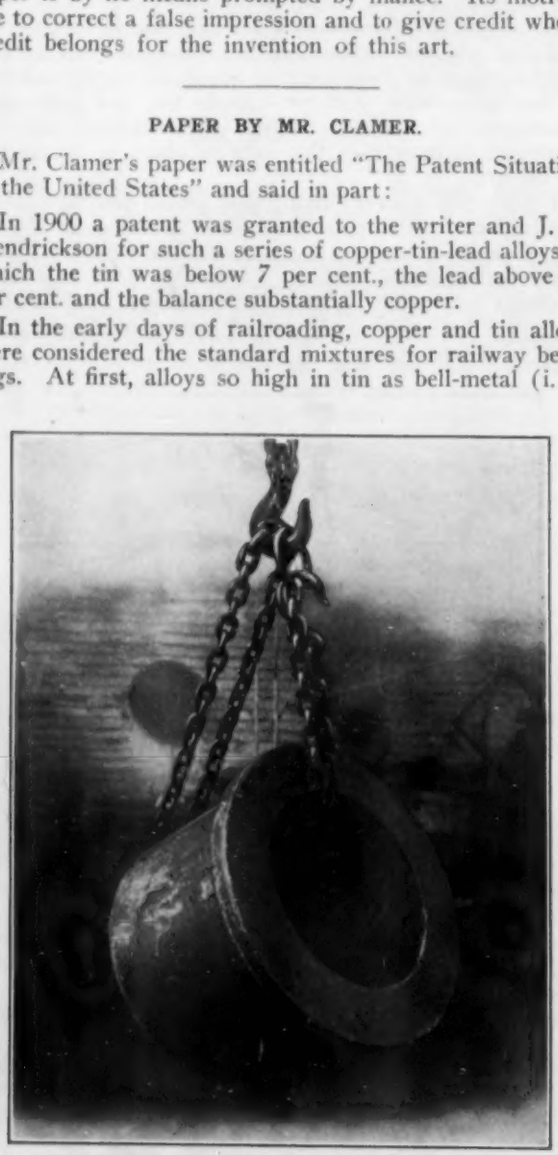


FIG. 2. GUIDE BEARING FOR STEAM TURBINE.

During this period Alexander Dick in England invented an alloy for bearings of copper and tin which contained lead. This was the first step toward the production of more plastic alloys for bearings outside of the previous mentioned reduction in tin. Both of these changes, i. e., the reduction of tin and incorporation of lead in the alloy, tended toward the production of more yielding or plastic alloys. The composition, 80 per cent. copper, 10 per cent. tin and 10 per cent. lead soon became largely used not only in England, but also in this country. In addition to these metals, there was also added to the alloy a small amount of phosphorus (approximately 1 per cent.), this alloy being known as "Standard Phosphor-Bronze."

In 1892, Dr. C. B. Dudley, chemist for the Pennsylvania R. R., as a result of very carefully conducted and elaborate service tests, proved conclusively the following facts:

That rate of wear and tendency toward heating diminish with the diminution of tin and increase of lead in the alloy. Dr. Dudley's tests first compared the "Standard Phosphor-Bronze" with the copper and tin alloy without lead; but as the alloy containing lead was found to be so superior to the alloy without it, further tests were made increasing the lead and decreasing the tin, until the alloy in Dr. Dudley's experiment "B" was reached, which consists of copper 77 per cent., tin 8 per cent. and lead 15 per cent. Dr. Dudley attempted to make alloys with higher lead and lower tin content, but failed to produce satisfactory bearings of such alloys because of segregation. In the light of our present knowledge on the subject, it is hard to understand why Dr. Dudley failed in his attempt, the only explanation which would apparently account for his failure, being the presence of some detrimental impurities, in all probability phosphorus, as Dr. Dudley's tests were practically all made with alloys containing this element. Phosphorus has the property of maintaining the alloy in a liquid condition for a long period of time, and this is just the condition which is to be avoided in order to produce homogenous copper-tin-lead alloys, high in lead. Dr. Dudley adopted as a result of his experiments, as a standard for the Pennsylvania R. R., the above mentioned alloy, which has since been known as "Ex. B. Metal."

Appreciating the advantages to be derived, were it possible to produce bearings with lower tin and higher lead content than Dr. Dudley's "Ex. B. Metal," we carried on a series of experiments and microscopic examinations of copper-tin-lead and copper-tin alloys which resulted in the invention of two processes of producing such alloys; our first patent covering the use of nickel for the purpose, the object of the nickel being to produce a quick solidifying matrix which would hold the lead in even distribution throughout its mass. Our microscopic examination proved conclusively that lead is but mechanically held in such an alloy in a copper and tin matrix, and as

lead has a very much lower solidifying point than the copper and tin matrix, the problem, as it appeared to us, was one of producing a matrix of quick solidifying properties, the first idea presented being to add a metal which would combine with this matrix and produce the desired result. After making experiments with practically all the high melting point metals, it was found that nickel gave by far the best results. In carrying out investigations further, we found it was possible to produce a quick solidifying matrix without the use of any foreign constituent, and without the employment of other than ordinary foundry methods. This consisted in limiting the amount of tin in proportion to the copper, so that only what is technically termed a solid solution of copper and tin was formed. This could be accomplished if the proportion of tin was maintained below 9 per cent. to 91 per cent. of copper. Our second patent, therefore, covered such an alloy in which the lead was at the same time above 20 per cent.

A suit was brought against the Brady Brass Co. for infringing this patent, in the Circuit Court of the United States of the District of New Jersey. After three years, during which time a great deal of testimony was taken, a decision was handed down by Judge Archbold who was especially assigned to hear the case, on July 31, '07. The following are quotations from his opinion:

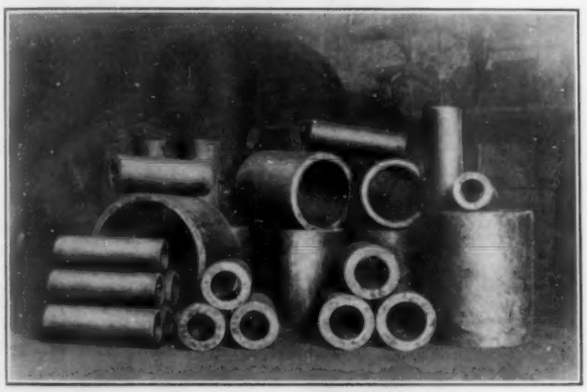


FIG. 3. BUSHINGS FOR PISTON ROD PACKINGS.

"The practical difficulty experienced with a copper-tin-lead mixture is that, in process of melting, a so-called eutectic or readily fusing alloy, between the copper and tin, is formed, as a subsidiary compound, which solidifies at a comparatively low temperature, allowing the lead, with a still lower melting point, to segregate and fall to the bottom, when present in quantity, producing what is known as lead sweat. To obviate this, a high solidifying point for the mass is requisite, at which the copper-tin matrix shall set quickly and hold the lead properly distributed through it, before it has time to run off or settle; and with this secured an indefinite increase of lead is possible. The received idea, however, at the date of the patent, as the result of Dr. Dudley's experiments, was that the limit in the diminution of tin and increase of lead has been reached in the relative amounts there determined, the proportion of tin so fixed being supposedly required to hold up the lead, and tin and lead having to be increased together beyond that. But it was discovered by the present inventors that this was not the case, and that on the contrary the subject was regulated by a critical relation between the metals involved, by which tin at less than seven per cent., by weight, lead at more than twenty per cent., and the balance, or some seventy-three per cent. of copper, there was a quick solidification of the mass without forming of any appreciable eutectic alloy, the large percentage of lead present being held and retained without difficulty, a small percentage of other metals, such as antimony, zinc, iron, etc., to be found in ordinary brass scrap as impurities, being also permitted. The proportions so given, it is to be observed, conform to a critical point in the constitution of copper-tin alloys, on one side of which, according to the relative percentages employed, they solidify or set quickly, at a high temperature; and on the other, by reason of different percentages, they combine differently, forming among other subsidiary compounds certain eutectic mixtures, which remain liquid for a much longer period, cooling slowly. The critical point is a well demonstrated scientific fact, which is generally if not universally accepted; and is shown to exist close to where there are nine parts of tin to ninety-one of copper, or relatively something over nine per cent. of the former. Having regard to this, and the consequences which flow from it when lead is additionally introduced, all the tin-copper-lead alloys divide sharply into those which contain this relative proportion of tin and copper, which by reason of their high melting point and the absence of eutectic alloys permit of a large content of lead; and those which fall outside of these limits, where this is not possible. The adaptation of this principle in the production of anti-friction alloys for railroad bearings constitutes the merit of the present invention and the contribution made by it to the journal bearing art. Its utility has been most signally recognized, the Pennsylvania Railroad having adopted and made large and increasing use of the alloy for a number of years, at first with the addition of a little nickel, which was supposed to produce a more homogeneous mixture, but latterly without it. And, upon certain bearings sent out from the Pittsburg shops for use on the lines west of there, having been found to infringe, the Company on notice desisted. It is also in use on the extensive system of the Norfolk & Western Railroad. And upon being submitted to counsel for the Eastern Railway Association, the companies composing that Association were advised to respect the patent, the practical significance of which will be appreciated. The proportions specified in the single claim of the patent are "less than seven per cent. of tin, and more than twenty per cent. of lead, and the balance of copper." But these amounts are to a certain extent suggestive only and are not strictly adhered to in practice, the most satisfactory results for high grade bearings being secured with an alloy of five per cent. of tin, thirty per cent. of lead and sixty-five per cent. of copper, a variation which the patent permits and was intended to cover. This with a small fraction of sulphur, which is of no materiality, is the combination made use of by the defendants, who thus admittedly infringe, if the patent is valid."

"This does not present simply the case of a copper-tin-lead alloy, low in tin and high in lead, nor yet of a specially composed journal bearing material. But it consists in the establishment of a precise rule or formula, by which within certain limits, to the extent desired, and without other than ordinary foundry methods, a homogeneous mixture of this general character, known to be of the highest utility for the purpose, is capable of being successfully produced. Standing for this, as the patent clearly does, there is nothing in what is so sought to be urged against it, which detracts from the merit or the validity of the invention."

An appeal was taken to the United States Circuit Court of Appeals which reversed the decision of Judge Archbold, finding that the claim of the patent covered only a product and not a process, and that the alloy as covered by the claim differed from Dr. Dudley's "Ex. B." metal and other copper-tin-lead alloys only by degree, and was therefore not patentable and declared the patent invalid.

The Supreme Court of the United States, upon appeal, denied a *certiorari* and application was thereupon made to the Patent Office for a re-issue of the patent. The patent laws of the United States provide for a re-issue of a patent provided errors are included in the original specification which make the patent inoperative, and that such errors arise from inadvertence, accident or mistakes without fraudulent or deceptive intention. This application to the Patent Office was made because the original patent as drawn was believed to cover the real invention as defined by Judge Archbold as above recited, i. e., "that the patent does not simply present the case of a copper-tin-lead alloy low in tin and high in lead, nor yet of a specially composed journal bearing material, but it consists in the establishment of a precise rule or formula by

which, within certain limits to the extent desired, and without other than ordinary foundry methods, a homogeneous mixture of this character known to be of the highest utility for the purpose is capable, of being successfully produced."

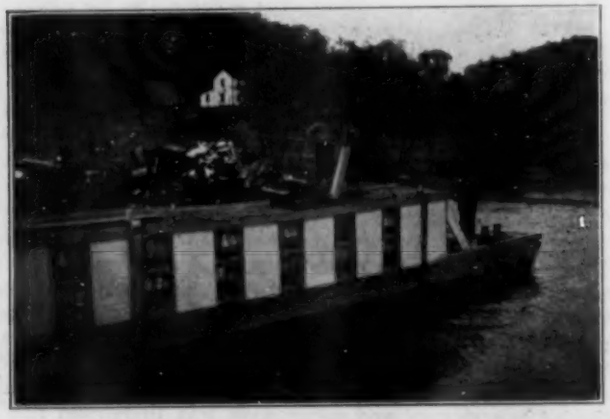
The Court of Appeals however, speaking by Judge Gray, reversed Judge Archbold's decision, taking an entirely different view of the patent, and stating that the invention was for a mere product low in tin and high in lead, and differing from other products merely in degree. The inadvertence therefore consisted in the preparation of a patent which Court constructed on the one hand to be for the establishment of a precise rule or formula, and on the other hand, to be for an alloy low in tin and high in lead, and differing only in degree from what had gone before.

In consequence, it was only after this case had been "threshed" out for practically four years, that such errors in the specification became apparent. The Patent Office took this view of the matter and have re-issued the patent.

The Patent Office have by the re-issue of this patent sustained the opinion of Judge Archbold, i. e., that the patent covered not only a product, but a process, and the effect of the re-issue is the same as an entirely new patent, which is affected in no way by the decision of the United States Circuit Court of Appeals.

COLLECTING OLD METALS ON THE OHIO RIVER.

A dealer in old materials has remarked "everything comes to the junk shop, only give it time," and a visit to the establishments of any of the old metal dealers proves this assertion. Every form of metal ware, no matter how valuable or how fine, is eventually classified as junk and treated accordingly. The accompanying photograph shows how worn-out materials of all kinds are collected on the Ohio River, the vessel in question, the Annie M. Shaw, of Ironton, Ohio, being virtually a floating junk shop, and even more, for she not only collects old metals, old bones and every kind of old material of any value and stores them on the top of her cabin as seen in the engraving, but underneath is a crockery and general notion store, the goods of which are exchanged for junk. The vessel is simply a flat bottom scow with a cabin house, and is towed from place to place on the Ohio at such points where it is convenient for the inhabitants to dispose of their worn-out materials. During the sweltering summer season no doubt many of the old metal men of the large cities would be very glad to exchange places with the skipper of the Annie M. Shaw.



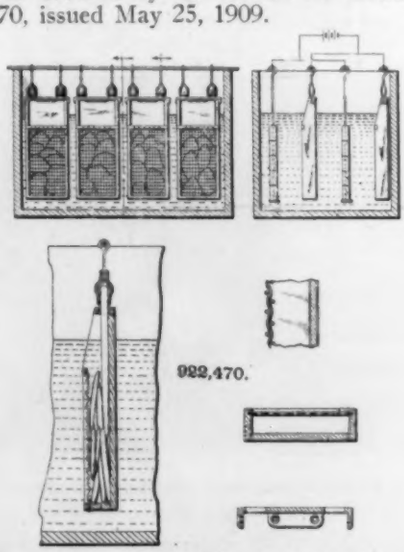
OHIO RIVER JUNK BOAT.

UTILIZING ANODE SCRAP.

As is well known, the question of disposition of the odds and ends of anodes from the plating room is a troublesome and puzzling one. It does not matter whether the scraps are from nickel, brass or copper anodes, when the anode has served its purpose as far as possible for an original anode, there is a considerable portion remaining which has, as a general rule, been disposed of either by sale as scrap metal or by remelting to make new anodes.

Both of these practices are wasteful, as in the one case the real value is never realized and in the other the formation of oxides when remelting the scrap is a cause of serious deterioration, consequently only a small percentage of scrap can be safely used when making new anodes.

Any method that will dispose of the ears and bottoms of old anodes in a cheap and satisfactory manner should be hailed as a welcome innovation in plating practice. Such a scheme is now made possible by a recent invention which has just been placed upon the market by Messrs. Benjamin W. Gilchrist and George L. Rice, of Woodhaven, N. Y. The device, which is shown in cut herewith, is covered by United States Letters Patent No. 922,470, issued May 25, 1909.



It will be seen at a glance by referring to the illustration, the utility of the apparatus. The anode element proper consists of a rectangular-shaped shallow box made of acid-proof stoneware. This box is 18 inches long, 2 inches deep and 8 inches wide. It has two rectangular-shaped openings in one end through which the ears or lugs of a new anode pass.

The method of operation is extremely simple. The front of the box is laced up with a fibrous material such as rattan, the strands of which pass through holes in the sides of the box. After the anode is placed in position the front is laced up and then the space between the anode and the lacing is filled with the scrap material.

The current naturally attacks the scrap pieces first and they are gradually used up before the face of the new anode is acted upon.

The principal advantages of this method, aside from its scrap reducing feature, are: more active anode surface is furnished, the box will also use up all old stringing wires, etc., and will effect a saving in nickel of over 20 cents per pound.

Any sort of anode can be used, only keeping the scrap and the anode identical in character; that is, silver scrap is used with a silver anode, and so on.

THE ART OF DESIGNING.

By A. F. Saunders.

Form, the Basis of Design.

"One may do whate'er one likes. In art: the only thing is to make sure that one does like it—which takes pains to know."—*Browning.*

It will be my aim in the following article to give a series of simple suggestions, as to the basis of design, trusting they will prove an aid to the metal craftsman who feels the lack of some criterion or standard for his work. Also to assist him in forming sound judgment, in question of design; both as to form and its decoration. His work must be founded on logical reason, hence we must consider as most important, a thorough knowledge of the fundamental principles of design, as well as a thorough understanding of his material. Workmanship separated from thought inevitably decays or degenerates, while on the other hand design separated from workmanship is necessarily unreal and falls into affectation. Thus it is easy to understand how important an art training is to the artisan.

The best aid to the workshop student is to study the old work stored in our museums, without intent to copy, but to gather ideas generally applicable. He will find such study not only helpful but most interesting, and it cannot but help in time to greatly influence him in his work; also study well the writings of such men as John Ruskin and William Morris—both have done much to revive the spirit of the old master-craftsmen in our modern workers.

THE CYLIX. THE AMPHORA. THE HYDRIA. THE CANTHAROS. THE RHYTON.

EXAMPLES OF GREEK FORM.

wines, oils, etc. Articles of table use such as the Cylix, a most favored form of drinking cup, the Phiale and the Rhyton, both used for ceremonial purposes, and numerous other beautifully proportioned articles of both utility and ornament, all plainly proving that this art loving people considered the shape or form first of all, then decorating it in some simple yet harmonious manner. Never did they rely upon heavy or complicated masses of ornament indiscriminately applied for effect only, naturally they sought nature for inspiration, basing their individual taste and judgment upon what she offered. The Greeks were not extensive metal workers, as were the people of the middle ages, but their works in clay certainly established a standard of beauty in both line and form that is well worth our most careful study. We may also go back to the primitive ages, races of which are practically still with us, our Indians of the Southwest; here we have a people without art, tradition or conflicting theories of beauty; yet their utensils of daily use embody not only sound judgment as to utility, but also combine the very first principles of beauty, both in form and decoration; not a line but what had some significance, some serious meaning, while to us perhaps crude, nevertheless it conveyed a thought. They gathered both the inspiration and material from Nature about them, made with their own hands the very tools that wrought the simple products of honest construction and pleasing design.

EXAMPLES OF PUEBLO POTTERY.

First, I shall endeavor to emphasize the important bearing form has upon the student's work. It is the base out of which develops the very life of the object. What constitutes form, shape or outline? Let us go back to the art of the ancient Greeks: what were their simple, yet beautiful standards based on? Take for example, such utensils of daily use as the Cantharus, a vessel used as a cup. The Hydria and Amphora, vessels for carrying water, storing Surely the art of such a race came from their hearts. They could not help but produce objects of beauty.

In the preparation of an object there are two distinct phases: First, the evolution of form, then the application of decoration. The craftsman gets his first hint from the shape or outline of the object. This gives us the second principle that form should suggest the design, and if the form suggests the design it is equally true that use should

suggest the form. These are simply fundamental principles that cannot be ignored if pleasing results are to be obtained. The student should begin with the sketching of various shapes of simple outline, such as cups, vases, bowls, in fact any objects suitable to his line of work; perhaps a piece of jewelry, its outline is as much a factor, and needs as much careful study as objects of greater size.

Keep always in mind the purpose of the object, its practical use, and never adopt originality for the sake of novelty; only also remember it is far less important that one should have accurate knowledge of each particular style or period, than that he should have some standard of judgment and individuality, to enable him to know the good from the poor. Careful study and practical experience alone can teach him this, as there are no fixed rules for beauty; it is a question of cultivating a faculty of perception, a sixth sense so to speak. Thus, he is able to produce it in his own way. In ending this article I quote three fundamental principles as applying to form. My next suggestions will be on its decoration.

"That Form is most beautiful, that is most appropriate for its purpose."

Construction should be the origin of decoration and ornament.

Simplicity in composition is more difficult of attainment than complication.

THE ART OF ENAMELING AS APPLIED TO THE JEWELRY INDUSTRY.

By Winfield E. Dunham.

Centuries ago it was discovered that the action of silica (SiO_2), which occurs in the form of sand or quartz, if heated intensely with such oxides as soda or potash, produced a kind of slag or glass. This composition treated in the right proportions with either one of these oides produces the glass that forms the base of hard enamel. Before this glass is used in making the enamel it must be mixed with oxide of lead (PBO), or litharge as it is sometimes called. This combination tends to make the glass flow and the result is called flux or fondant. This is primarily the actual base of all colors.

WINFIELD E. DUNHAM.

PRODUCING THE COLORS.

Now as the enamel consist of glass or silicates of various materials, the application of different metallic oxides produces the various colors as are used in the manufacture of jewelry. It may be well to speak of some of the most common colors. White enamel, probably one of the most used, is composed of this flux or fondant mixed with an oxide of tin in the right proportions; green is also produced by the oxide of iron (FE_2O_3), or chromium (Ch_2O_3), yellow by uranium ($NA_2O_2UO_3$), blue, dark, by cobalt (Co_2O_3), turquoise by copper (CU_2O), violet and purple by manganese (MNO_2), red by chloride of gold of ferrous oxide, gray and black by iridium, which is very costly, or the combination of cobalt, manganese and iron. The manufacture of these colors is almost wholly controlled by the enamel manufacturers, rather than the jewelers as there are many secrets connected with its production which are carefully guarded after many years of experimenting. It is also strange, but quite true, that our best enamels to-day are most all imported, chiefly from Germany, France and Austria.

PREPARATION OF THE METAL.

Enamel may be used to best advantage on gold, copper, silver and a combination of copper and tin or copper and zinc containing 70 to 90 per cent. copper, called gilding metal. These metals, in order to be successfully enameled, must be clean and as free from any oxide as is possible. Gold should attain the boiling point in a solution of three parts water to one part nitric acid (HNO_3), and after being rinsed and boiled in water should be scratch-brushed and boiled again, after which it is ready to receive the enamel. Copper or gilding metal, after being pickled in the nitric solution, should be dipped in a solution of two parts nitric acid and one part sulphuric acid (H_2SO_4), into which a small quantity of muriatic acid is mixed. This serves to brighten the metal and also free it from oxide. Silver, unlike other metals, after being carefully pickled in a solution containing three parts water to one part sulphuric acid, must be firestained to get the best results with most enamels, the firestaining solution being nearly half and half nitric acid and water.

THE PROCESS.

When the stock of the material is thoroughly clean the enamel which is ground to a fine paste in water is next applied either by means of a small brush or generally by a fine steel point. This operation is known as charging, the various colors being carefully inlaid in their respective compartments without mixing. The various pieces of jewelry thus charged are ready for firing after being placed on pices of sheet iron, approximately seven inches long by four inches wide. These pieces or sheet iron, known to enamelers as tiles, are then placed in a muffle that is red hot and subjected to heat enough to make the enamel adhere to the stock. After one or two such operations of charging and firing the surface of the enamel is rubbed off leaving the letters, figures or intersecting lines plainly visible, the metal showing flush with the enamel. The enameled pieces are then ready to be cleansed of all the foreign substances which the surface of the enamel may contain, such as the emery or carborundum from the stones with which they were rubbed. This is done by immersing the articles in a solution containing equal parts of hydrofluric acid (HF) and water. The pieces are then brushed with water to remove the thin coating of enamel that is eaten off by the action of the solution. After this the pieces are again placed on tiles and subjected to a degree of heat that will produce a hard gloss on the enamel, thus ending the process of enameling. The gloss is greatly improved by being polished with a felt wheel, on to which a sort of a mud or paste of fine pumice has been applied. This produces a much better finish to the enameled surface.

APPLICATION OF ENAMELING.

There are many kinds of jewelry that are enameled, the more staple being the enameling of emblems of different societies, the enameling of school and college pins with their class or college colors and also the enameling of buckles, waist sets and buttons with our imitation of famous cloisoné work. The word "cloisoné" is probably derived from the old French—cloison, meaning a partition. These parti-

tions were made by ancient European and Oriental enamelers with pieces of wire soldered into various shapes to compose figures and outlines, but to-day the more modern way is to have these outlines cut in the die in which the piece is struck. This work being done chiefly on silver or silver plate is probably the best product of the artistic enameler. A thin coating of flux is first applied to the metal after which the colors are placed in various depths so as to give a blend or tone to the subject. As all of the enamels used on this sort of work are transparent, the exquisite beauty of the die work at the base of the enamel is plainly visible, thus imparting much life to the subject. Various landscapes, flowers and finish are so enameled, showing all the tints characteristic of their kind.

PAINTING ON ENAMEL.

Painting on enamel with mineral paint also figures quite prominently in jewelry. This paint, after being painted on a surface of opaque white or opal, is fired much the same as other enamels and is afterward protected from the acid pickle by the application of a thin coating of flux or fondant which is baked over the paint; as this enamel is transparent, the effect is as visible as before and contains a rich gloss. The comparative slowness in this operation of designing by hand is overcome by some manufacturers by the application of a process by which the outline is transferred from a metallic plate and afterward shaded with a brush, making the unnecessary slow process of great commercial value to the manufacturer. There is probably no other decorative branch of the jewelry industry that possesses so many operations and is so uncertain as the process of enameling, but at the same time the charming and beautiful effects produced are well worth the hardest efforts.

THE REMOVAL OF ARSENIC FROM BRASS SOLUTIONS.*

By Percy S. Brown.

The value of arsenic oxide as an agent used for brightening brass deposits is open to discussion, and in view of the fact there is necessity for investigating a method for removing this arsenic oxide it is probable that the plating profession will begin to consider the question from all standpoints and decide whether it is advisable or profitable to use an agent of this character rather than one that would not be objectionable even if used in excess. If arsenic oxide were a satisfactory agent for this purpose there should be no necessity for its removal.

The ordinary brass solution is composed of salts of copper, zinc, sodium and potassium, the proportion and character of these salts being greatly varied. Among these salts those of copper and zinc are liable to contain arsenic as an impurity in small quantities, while the anodes of brass also contains it. It is doubtful, however, whether the arsenic is present in sufficient quantity to make its removal necessary, and, without doubt, there are cases where brass solutions have been used for long periods (these baths containing no added arsenic), without any attempt being made to remove the arsenic existing in the bath as an impurity. We can start then with the assumption that it is only added arsenic that must be removed. This being the case, we can figure with a fair degree of accuracy just how much reagent must be added to throw the arsenic out of the solution, and by using an excess of the reagent we will also throw out any arsenic existing in the bath through impure salts and anodes.

In making the tests a bath consisting of the carbonates of copper, zinc and sodium, dissolved in potassium cyanide, ammonia and water was used. The sulphates of copper and zinc could have been used as well as the carbonates without vitiating the results, but this bath was merely made up for experimental purposes. Arsenic was added in the form of the oxide As_2O_3. The arsenic oxide was added to the solution in the proportion of 1 gram to each litre of the solution.

The first tests were made on a method, said to be in use by some platers, to determine what function the reagent performed. For this test ordinary charcoal was used, and no attempt was made to free it from moisture by ignition as it was assumed that in the ordinary plating room no such precaution would be employed. Two samples were run, one being used cold, the other hot; in both instances the solutions containing the charcoal in small lumps were allowed to stand for 48 hours with occasional shaking. Analysis of the solution at the end of that time showed that the arsenic had not been removed. It does not seem probable that even freshly ignited charcoal with all of its affinity for oxygen would have a complete reducing effect when crude charcoal has little or none. It is not unreasonable to suppose that the platers who have had success with this method can attribute it to the fact that their charcoal contained some impurity which acted as a reducing agent and threw the arsenic out of solution. Many salts lying around the plating room would exert this influence. This theory may sound unreasonable but it is far from impossible, and every plater knows that plating rooms, as a rule, offer exceptionable opportunities for such things to happen.

The second tests were made with a reagent known as magnesia mixture, which is made up by dissolving one part of magnesium sulphate in eight parts of water and adding four parts of ammonia, followed by two parts of ammonium chloride. This mixture should be allowed to stand for about two days after mixing before it is used. By adding this mixture to the brass solution the arsenic is precipitated as magnesium ammonium arsenate, $MgNH_4AsO_4\,6H_2O$. The brass solution should contain free ammonia for this method, and as ammonia is often used as a brightener in brass solutions it should cause no trouble to have it present. The precipitate of magnesium ammonium arsenate is of considerable bulk and should be removed by filtration, although after standing for a few days it settles out in fine crystals. A question that should be considered in using this solution is the possible beneficial result that may be obtained from the excess of magnesia mixture. The ammonium salts should not be objectionable, and it is possible that the magnesium salts might act as a brightener. This point can only be determined by careful tests. In order to obtain complete precipitation of the arsenic it is advisable to add an excess of the reagent which, roughly figured, would amount to one gallon to each ounce of arsenic oxide present. The fact that such large quantities of the magnesia mixture must be added to the solution is one objection to this method.

*Paper read at June 25 meeting of the National Electroplaters' Association.

The third tests were made with one of the simplest forms of reagent that could be used, namely lead oxide (PbO) commonly known as litharge. The addition of lead oxide to the solution causes precipitation of lead arsenate, $Pb_3(AsO_4)_2$. It was found that with occasional stirring the precipitation of the arsenic was complete in a few hours and it is probable that it could be accomplished in a shorter time. The precipitate is heavy, and as an excess of the lead oxide is used it settles rapidly. This is a marked advantage as the clear solution can be syphoned off and the precipitate easily removed. In using this reagent, as in the case of magnesia mixture, an excess is added which should amount to about five ounces to each ounce of arsenic oxide in the solution.

One advantage derived from adding any reagent in excess is the removal of arsenic added to the solution through using impure salts and anodes. Although under ordinary conditions it is not necessary to remove this small amount, it is certainly advantageous to remove it when removing added arsenic. It is also an easy matter to forget the exact amount of arsenic oxide that has been added and by using an excess of the reagent the operator will insure against incomplete precipitation to a certain extent.

Of the three methods described, the one depending on the formation of lead arsenate by the addition of lead oxide seems to offer the best advantages as the reagent is cheap, convenient to handle, can be weighed out and added to the solution direct, causes rapid precipitation, and has no known objectionable influence on the brass solution. Unfortunately the tests could not be carried to the point where a comparison of the brass solutions after the separation of the arsenic could be made, and therefore those who desire to remove arsenic from their brass solutions must make the experiments themselves.

There are many methods of determining arsenic, from a chemical standpoint, but there are few that could be used to precipitate it direct in the presence of copper and zinc salts. It is also worthy of note that the fact that the solution is made up with potassium cyanide throws out methods depending on the use of acids. It is, of course, probable that better methods for the removal of arsenic from brass solutions will be found and this paper may serve a good purpose by calling the attention of platers to the subject. For the benefit of those who may desire to go deeper into the subject it might be well to call attention to certain salient points that should be considered.

The reagent should be inexpensive, it should be as simple as possible, it should cause rapid and complete precipitation, it should be insoluble in the brass solution. A reagent that would have a good effect on the bath when used in excess might have some of the above objections and yet be more satisfactory to use. For this reason a careful comparison of the magnesia mixture and lead should be made before deciding between the two. In conclusion I would state that this paper was rather hurriedly prepared and invites criticism, and such criticism will be appreciated as indicating that the subject is of sufficient importance to warrant it.

FRENCH GREY AND DARK OXIDIZED FINISH.

SUBSTITUTE FOR THE PLATINUM CHLORIDE SOLUTION.

By J. J. MacManus.

The French grey and dark oxidized finishes still continue to be popular, and manufacturers complain of the expense of the oxidizing fluid used. They object to using liver of sulphur, for if the article is not heavily plated, the sulphur solution will strip the silver off. On the other hand, no matter how the solution may be treated, the deposit will always have a tint of blue and is not a soft finish.

But as French grey has to be produced at such a low cost, the manufacturer cannot afford to use the chloride of platinum. Some platers fix up an electro-plating tank using arsenic and cyanide of potassium; but taking into consideration the time consumed in hanging on and taking out wire by wire, watching the solution, which is not always reliable and is a source of annoyance to the plater, it is not surprising that they have gone back to the old methods.

The object of this article is to give the benefit of my experience and to show how to produce a good oxidize for solid and silver-plated ware; also a good black finish for brass and German silver, at a cost of less than 50 cents a gallon according to the amount of chemical purchased at one time. It does not have to be painted on half a dozen times, for it will adhere instantly to the metal to which it is applied, forming a uniform, durable coat. This solution has been used by silver etchers with as good results as with platinum. To my mind it is just as good, and when properly used is taken for platinum finish and does not fade out. The formula is as follows:

Dissolve in a gallon of commercial muriatic acid two pounds of white arsenic and eight ounces of copper sulphate, the solution being hastened by heating when the arsenic is all taken up. Let the mixture cool and it is ready for use. The solution should always be used cold, for if heated the action is too brisk and the black coat is deposited so rapidly that it will easily peel off. This bath is generally made up in an earthenware crock or an agate pot with cover and under a hood or gas flue, as some disagreeable, irritative and corrosive vapors are evolved during the dissolving of the arsenic.

The mixture should be allowed to cool without the addition of any water, as if diluted the arsenic is reprecipitated out as oxychloride, rendering the solution unfit for use. The work should be thoroughly cleaned in cyanide and well rinsed off with clear water before applying the black dip. The article to be colored may be painted with the solution or dipped. The required shade is obtained as usual with a piece of cloth with fine pumice stone or on the lathe with a bristle brush. For very good work use a canton-flannel buff well trimmed with a little bicarbonate of soda and a beautiful finish will be produced. This bicarbonate of soda treatment is done after the bristle brush and pumice stone operation.

PLATING ALUMINUM.

The problem of plating aluminum with some metal resisting corrosion, is claimed to have been solved at last. The plating bath used in the new process is a solution of the metals to be employed in alcohol, and excellent results have been obtained with gold, copper and nickel, although silver and lead proved unsuitable. The results with zinc and platinum have been indifferent. A current of two and a half to three volts is used and the aluminum to be plated is first connected to the anode to remove the oxide, the connections being then reversed. Oxide does not form again, a clean surface being obtained that satisfactorily takes the plating metal deposit.

HOLMANITE.

A natural alloy of tin and bismuth which has been called Holmanite has been discovered on the property of C. Vey Holman, situated on Catherine Hill, near Bangor, Me.

VENTILATION OF PLATING ROOMS.

By Oscar A. Hillman.

The system of ventilation herein described has been used by the writer in installing a large number of plating and coloring rooms for a number of years, and nothing has been incorporated in this article that has not been proven efficient and practical. The most prevalent fault in the ventilating systems now in general use is that the blower and suction pipes are invariably attached to the ceiling where they remove only the lighter gases, while the heavy, most injurious ones are left in the room, where they promptly begin their work of destruction by attacking the machinery and piping, tarnishing the work, injuring the health of the workmen and contaminating the solutions that absorb them.

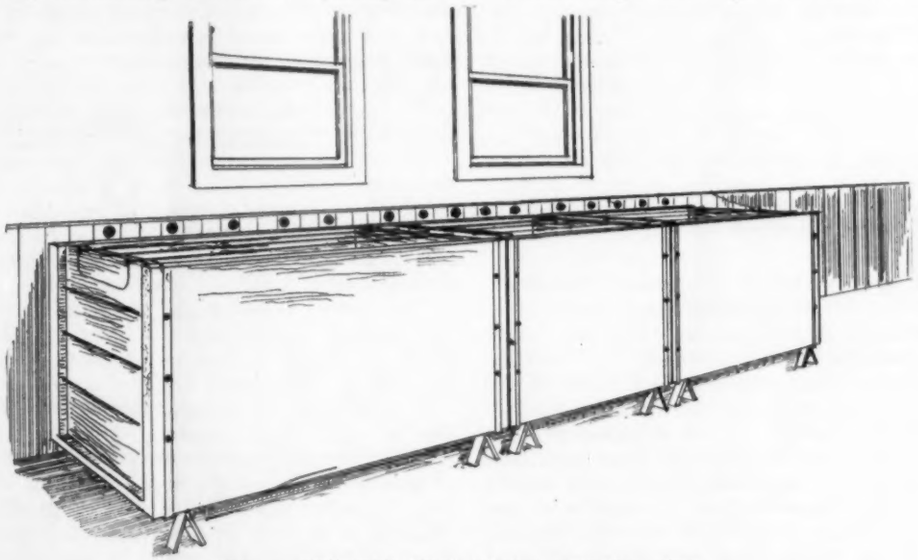


FIG. 1. SHOWING PINE BOARD SUCTION PIPE.

The only practical way to remove all the noxious fumes is to arrange the suction pipes or boxes in such a manner that the gases are drawn in and expelled as soon as generated, before they have a chance to become diffused about the room. While all solutions used for plating, pickling or dipping give off poisonous gases to some extent, the worse ones are those which are made with a large amount of cyanide of potash; electric cleaning solutions that contain a large amount of caustic soda, caustic potash or any other of the hydrates, all acid dips and pickles, and all oxidizing dips that contain any form of arsenic or give off chlorine or hydrogen sulphide gas.

If the solutions used in a plating plant consist principally of nickel, acid copper, silver, or those that do not give off very much gas, those which do could be arranged along the wall with a large suction pipe made of hard pine boards placed in back of the tanks or jars so that the holes in the pipe would be just above the upper edge of the tanks. (See illustration No. 1), so that as soon as any steam or gas starts to rise from the solutions they are immediately drawn into the pipe and carried away by the exhaust fan or blower. For a large plant where the plating tanks are laid out in the middle of the room and are worked from both sides, the most convenient way is to run a large flue along the ceiling from the fan through the room from which branch pipes can be run to the solutions.

Instead of cutting holes in the branch pipes so as to have an overhead suction, as is generally done, build an air-tight box around each tank about four inches wide by two feet deep and secure it so its upper edge will be three or four inches above the tank, then make two-inch holes about ten inches apart in the box so their lower edges will be just above the tank. Connect the box with one of the branch pipes with an upright pipe at the end of the tank where it will not interfere with the manipulation of the work. (See illustration No. 2.)

Where large acid dips are used it is best to have a large wooden blower placed as near the acid jars as possible so as to remove every trace of acid smoke immediately as it consists of poisonous gases that are very heavy. The size of the blower will depend on the size of the room and the solutions used, but a fan that is a little larger than necessary will do no harm, while one that is too small is almost useless; it is always best to get a large one. As a forty-inch fan will require two and a half horse power to drive

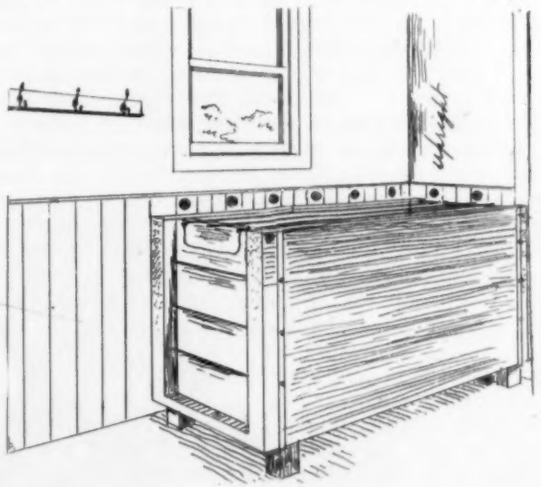


FIG. 2. SHOWING UPRIGHT SUCTION PIPE CONNECTION.

it sixteen hundred revolutions per minute, wide belting and pulleys must be used to prevent slipping.

All lacquer and japanning ovens should have a large metal flue attached to the branch pipes so as to remove the offensive smell and keep the ovens free from dust. Another common mistake is to have the inside of the flue and pipes lined with tar or pitch in order to make them air-tight; in cold weather the lining becomes so brittle that the least blow or vibration shatters it, and as soon as it gets warm it commences to drip and proves a nuisance. The best method, as well the cheapest, of making them air-tight is to have a strip of felt laid in the seams between the boards, then paint inside and out with a thick paint. All metal flues, pipes, etc., should be protected with a coat of asphaltum varnish.

To protect the blowers and hangers from the corrosive effects of the steam and gases, a liberal application of vaseline and black lead will be found effective. Although it may seem too expensive to have separate suction boxes for each tank, they will pay for themselves in a very short time by saving the machinery and piping, besides keeping the room clean and sanitary.

THE WORKING OF ZINC.

By C. P. Karr.

The press working of metals is more closely related to forging than to that of its associated processes. The final result is obtained, either by a set of blows, infinitesimally small, perhaps, in the case of the hydraulic ram, or comparatively large as in the first blows of the drop forge, or imperceptible as in the drawing process. In the press working of zinc the metal is heated so as to promote the elastic flow of its molecules over and upon one another in the various processes. It is a well known fact to the foundry man that a zinc ingot is readily broken at a very low temperature, but if the ingot be warmed to say 100 degs. F., its resistance to rupture is increased many times.

For the production of sheet zinc the tools used are cylindrical rolls of various forms and revolving at different speeds adapted to the amount of elongation required. For the working of the metal the tools required consist of a lathe, a form or mold in which to shape the article, a tool rest with a series of holes for receiving a pin to keep the tool from slipping, and a few spinning tools or burnishers of different sizes and shapes, such as a ball tool, a curved oval, a plain round burnisher and some special tools made to suit the requirements of unusual shapes. Zinc may be worked on a foot lathe in the same manner as brass, copper, britannia metal and lead, but zinc must be spun quite hot, practically hot enough to make a lubricant, such as soap, blister. In press working the effects are produced by press rams; the shaping and limiting extensions are executed by dies.

It is important in the working of zinc to provide a suitable lubricant for the dies, and to avoid excess. When oil is applied the sheet of metal that is being worked is placed under a roller of felt or a brush or a flexible pad that is kept saturated with the lubricant. In working zinc for pans, covers or pieces that are deeply drawn, soap-suds is preferred to oil. Various mixtures of soap, grease, tallow, paraffine and water are used, sometimes white lead and tallow. In some instances only one blank out of a number is dipped into a lubricant, the odd one being sufficient to keep the dies in working order. In the working of zinc where the distortion stress will be large the temperature of the blank should not fall below 230 degs. nor exceed 302 degs. F.

In a punching operation the blank must be somewhat thicker than the ultimate cross section to allow of contraction, because all parts of the surface are compressed or elongated, but not uniformly. In some bending processes the thickness of the metal is not materially lessened. In embossed work the raised portion is formed by a bending process, a punching die being the tool used to shape and give a permanent set to the metal.

In a drop press the forming work is produced by making the punch of a soft and fusible metal, such as a suitable alloy of lead and tin, for making such work as sauce pans, dish pans, wash bowls and other shallow dishes. The forming is done by successive stages, a little at a time. The difficulty met with in working up a zinc plate in the drawing process, by which depth after depth is secured, is due to the tendency of zinc to crystallize under repeated blows or strain and thus lose its ductility. The vast difference between the working of zinc and brass may be appreciated by a comparison of their respective resistance to tension, cast brass having an ultimate resistance of from 18,000 to 25,000 pounds per square inch, while the range of cast zinc is from 7,000 to 8,000 pounds per square inch. To overcome the tendency to crystallization the drawing and spinning processes must proceed more gradually and be accompanied by a greater duration of time than is found necessary with copper, brass or German silver. Careful and prolonged annealing will overcome the crystalline arrangement of the particles and consequent brittleness.

The form on which the metal is spun may be either hard or soft wood or metal. Close-grained pine or white wood is adaptable for most purposes and may be readily worked up beforehand into the required shape.

The rotation of the lathe should be quite rapid and the disc should receive a coating of grease lard, heavy oil or soap before applying the burnisher. A small percentage of aluminum will improve the ductility of zinc and permit of greater extensibility at one operation than can be obtained with pure zinc. If an alloy (not a mere mixture) of zinc and lead could be made in which the lead bears but a small ratio to the zinc, the length of the crystals would be reduced and the blank would work up more readily in the drawing and punching processes.

The application of zinc, especially zinc alloys, to forming processes, opens up a new field of endeavor. If the mineral Scheeletine, a tungstate of lead, could be smelted down with calamine, a silicate of zinc, in such a manner as to make zinc the dominant metal, the resulting alloy should yield a metal having a tenacity, ductility and compressibility greater than that of zinc alone, and be in every way desirable.

A DIP BLACK FOR BRASS.

By Joseph Dimes.

The following solution I have found to give excellent results on brass goods for a black or gun metal finish. If the articles are to be matt-black they are first matt-dipped, then passed through the mercury dip, composed of bichloride of mercury, and cyanide of potassium dissolved in one gallon of water, passed through clean water, then boiled for about five minutes in the following solution:

½ lb. yellow arsenic,
2 lbs. cyanide potassium,
12 qts. water.

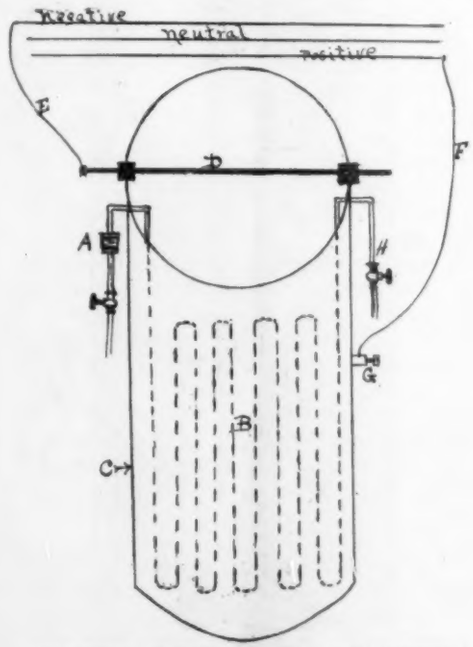
When the articles are removed from the arsenic solution they are washed and dried in the usual manner, and can be lacquered if desired, although the color is very lasting without lacquer. If a polished black is desired, polish the work the same as for plating, then pass through the potash solution. To remove grease wash in clean water and put right into arsenic solution, no mercury dip being necessary with polished surfaces.

HOW TO MANIPULATE THE ELECTRIC CLEANER TO ADVANTAGE.

By Royal F. Clark.

Very often when the subject of electric cleaners is mentioned the method is condemned. It is the writer's intention in this article to impress upon the reader's mind the vital points to be observed when installing and operating an electric cleaner to achieve success. The writer has used the electric cleaner in preparing surface for plating upon articles of copper, brass, oreide, sheet tin, iron, steel, German silver, white metal and lead with success.

The tank can be of any desired shape, according to the class of work to be cleaned, but the round or cylindrical type is to be preferred on account of the current coming from all points equally, even from the bottom of the tank. The positive wire from an 8 or 10-volt circuit should be fastened securely to a clean surface on the side of the tank below the top, in order to obviate the trouble of having a corroded connection from the fumes



ELECTRIC CLEANER TANK AND WIRING.

given off by the boiling solution. The rim of the tank should have a piece of thick steam hose placed over its entire circumference. This will insulate the negative or cathode bar, which extends across the top of the tank, and should project 4 or 6 inches at either side from the tank.

Wooden blocks can also be made with slots to hold and insulate the bar. This cathode bar should be of solid copper or brass three-quarter inch to 1 inch in diameter, and the negative wire from it to the mains, should they pass near the tank, can be a piece of flexible cable which allows the bar to be handled easily. The tank should have placed in it a steam coil standing upright against the front, which would be the side nearest the operator. The coil must *not* be made of galvanized iron pipe, as the solution will absorb the zinc and cause a deposit to be formed upon the work to be cleaned, and therefore interfere with the process of cleaning. The coil should come up to within 3 or 4 inches of the top of the solution. The pipe should be of one-half or three-quarter-inch black iron and extra heavy; all joints must be tight as possible in order that the solution shall not become diluted or drawn out by vacuum back pressure.

Here is a point well worth remembering. By having the coil directly in front when the solution is boiling, at which point it always should be, it will force the grease and oil to the rear edge of the tank so that it will not adhere to the work when putting it in and taking it out, and there it can be readily skimmed off. The steam pipe, before it enters the tank, should be cut and have a piece of steam hose inserted for insulation. The work should be connected to the bar before immersing in the solution, unless it is of iron or steel or unless the hook or frame be of a metal which would be soluble in the solution. By having the flexible cable attached to the cathode bar, it can be raised or lowered and moved about at will, also admitting the handling of an iron wire basket partially filled with small work to be cleaned. The solution for iron or steel can be made as follows:

One gallon water.
Eight ounces commercial caustic potash or caustic soda.
Eight ounces sal soda.

For metals, the tarnishing of the polished surfaces of which must be obviated, use 8 ounces cyanide of soda in connection with the above.

After cleaning the various metals, excepting iron and steel, for some time, it will be noticed that the solution has absorbed a metal and is depositing it upon the work. At this point a new solution should be made. In summing up it might be well to bear in mind the following: Keep the solution at the boiling point, connect hook or frame to bar before immersing work, also take it out while still connected. If work tarnishes on coming out of the bath, add some cyanide. If desired, the work can be boiled in a solution of platers' compound first to remove the bulk of grease and then a few seconds in the electric cleaner will remove the film of soap and leave the surface perfect for direct plating.

The above illustration shows an electric cleaner complete attached to the 10-volt side of mains of the three-wire system.

A = Steam hose insulator with clamps.
B = Coil of black iron pipe.
C = Iron tank.
D = Cathode rod.
E = Negative wire of flexible cable.
F = Positive wire.
G = Connection (positive) on side of tank.
H = Exhaust pipe.

FLOWERS NOT METAL WARES.

APPRAISERS REFUSE TO CLASS ARTIFICIAL VARIETIES UNDER THAT HEAD.

In overruling a protest filed by Downing, Judas & Co. and the Chicago Mercantile Co., the board of United States general appraisers has decided that artificial flowers constructed in part of metal are not on that account to be admitted into this country under the provision in the tariff for "manufactures of metal, of which metal is the component of chief value," at the rate of 45 per cent.

In addition to the claim of the importers for duty under the metal schedule, the same rate was alleged under the cotton paragraphs of the tariff. In denying the claims of the importers, United States General Appraiser McClelland says:

"While it is true that metal is used in the construction of the articles in question, we think the special provision for 'artificial flowers and stems and parts thereof, of whatever material composed,' is more specific than the provision for manufactures wholly or in part of metal."

PLATERS' WRINKLES.

By C. H. Proctor.

(Continued from May Number.)

Many platers in the coloring of jewelry claim that for rose gold only pure gold should be used in the form of cyanide of gold. A nearly boiling solution and a high voltage should be used for good results.

Ammonia or arsenic should not be added to a copper bath if dark or peeled deposits are to be avoided. A little bisulphite of soda will be found good practice. This acts as a conducting salt as well as forming cuprous sulphite in solution, which is readily soluble in the cyanide and produces a softer deposit.

Cyanide of nickel can readily be produced by precipitation from sulphate of nickel with a strong solution of cyanide of potassium, avoiding an excess, and then washing carefully in the usual manner; by evaporating to dryness the exact amount found most suitable for addition to the baths can be made by weight.

The Old Brush or Colonial brass finish can be produced upon sheet brass goods without previous polishing in the following manner: Acid dip the goods in the regular manner and then brush them with a brass wire machine. Scratch-brush, moistening the articles with a little pumice stone and water. Then dry and lacquer in the usual manner.

French greys can be produced directly from a specially prepared silver bath; the bath usually consists of the regular bath, to which is added arsenic dissolved in caustic soda. The articles after plating in the regular bath are immersed in the bath for a minute or two; a dark grey silver is produced which, when relieved or burnished in the regular manner, produces an excellent French grey.

In silver plating, when desirable to produce a hard silver deposit, considerable cyanide of nickel can be added to the silver bath. In a like manner the cyanide of nickel can be added to the gold bath. It produces a harder and clearer deposit that does not tarnish as readily as baths made up with gold alone. The method is much used in gilding low karat watch cases and also upon gold-filled cases.

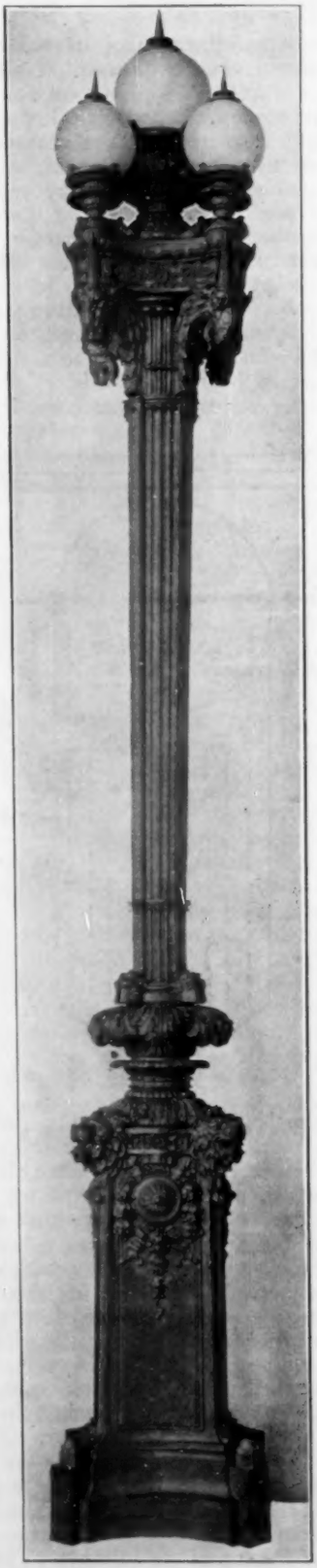
In producing rose gold tones either upon brass articles or upon solid gold, what is known as a smut is required for good results. The smut is a darkened surface which when relieved upon the high lights in the usual manner before gilding gives the ground for the rose. The smut can be prepared by using:

Hot water	1 pint
Muriatic acid	1 pint
Sulphate of copper	4 ozs.

This is always used warm; if the surface is too dark, it is run through the cyanide dip to lighten the color.

In preparing dark green golds with antique effects the solution should be made up of fine gold and silver, and when the light green gold is produced arsenic dissolved in pure caustic soda should be used; one part of the soda dissolved in a little hot water will dissolve 2 parts of arsenic. By careful additions very beautiful antique effects can be produced, especially if the articles are lacquered. Afterwards the aniline colors soluble in denatured alcohol can be applied with camels' hair brushes, producing very fine effects upon the surface of the metal. This must be very dilute; the colors readily penetrate into the lacquer, producing a transparent effect.

A CAST BRONZE ELECTROLIER.



The cut shows one of a pair of cast bronze electroliers presented to New York City by the Municipal Art Society and erected in Long Acre Square. These electroliers were made by the Gorham Manufacturing Company and cost $10,000.

MODERN BRONZES.*

By C. Vickers.

Under this head we will classify all alloys of copper which contain some metal or metalloid, the use of which in alloys has been possible only within recent years. The modern bronzes, therefore, comprise those alloys containing aluminum, silicon, magnesium, phosphorus, manganese and iron. These elements, with the exception of aluminum, are not used to form alloys of copper in the same manner as tin, zinc or lead, but act as deoxidizers of these alloys, increasing their tensile strength and ductility. Taking these various elements in the order named above, we will first consider

ALUMINUM.

At the present time aluminum in copper alloys is confined almost exclusively to the copper zinc series, forming aluminum brass. The content of aluminum in such brass is usually very small, compared with aluminum bronze, and is added to impart fluidity to the alloys more than for any deoxidizing or strength increasing qualities the aluminum may possess. A typical alloy is copper, 56; zinc, 44 per cent., aluminum, 6 ounces. This metal being cheap and running exceedingly fluid, has found great favor for making such plumbing goods as ferrules. It is this property which aluminum possesses of imparting fluidity and preventing the oxidation of the zinc, thereby supressing the smoke, which is such a disagreeable feature in casting yellow alloys, which has caused this metal to be so extensively employed for small brass castings such as saddlery hardware, etc. An alloy used for this purpose is copper, 60; zinc, 36; lead, 3, and aluminum, 1 per cent. Large castings are difficult to cast without dross, and various schemes such as horn gates, skim gates, long runners, are used to overcome this difficulty. The most important particular, however, is to pour the metal at as low a temperature as possible.

SILICON.

The use of silicon in the brass foundry is mostly confined to making copper castings. It is used in the form of silicon copper, which is supposed to contain from 10 to 30 per cent. of silicon. An analysis of one of the best makes showed only 9.63 per cent. silicon, the balance copper. This was a brittle alloy, and one-fourth of one per cent. would make copper castings solid. It is advisable though, in ordinary practice, to use one per cent. at least. In an alloy of 60 per cent. copper, 40 per cent. zinc, the addition of one per cent. of 10 per cent. silicon copper increased the tensile strength of a cast bar to 50,000 pounds per square inch, which will compare favorably with manganese bronze cast in the same manner, viz., into a round bar molded in the ordinary manner with a three-inch cope, the metal being run straight into the casting.

MAGNESIUM.

This is also used as a deoxidizer of copper in the proportion of two ounces magnesium to one hundred pounds copper. The conductivity of such copper as high but the castings are very liable to defects and cause considerable loss, as these defects do not show until the work is machined. One concern has partially overcome this difficulty by the use of a small quantity of phosphor tin with the magnesium, about six ounces to the one hundred pounds copper.

*From a paper read at a meeting of the Pittsburg Foundrymen's Association.

PHOSPHORUS.

This element is so well known to all brass founders that it needs no description. It is used either in the stick form as yellow phosphorus, or in alloy with either copper or tin. It is the best deoxidizer known in brass founding, being especially valuable in the copper-tin alloys, with which it forms the well-known phosphor bronze. The old-style phosphor bronze was so rich is phosphorus that it would cut into the sand of the mold, much like water, and for that reason required special training of the molder or furnaceman to gauge the proper casting temperature, otherwise the castings would be shapeless of mingled sand and metal. Of late the tendency has been to go to the other extreme. Some writers contending that only just so much phosphorus should be used, as will remove the copper oxide from the metal. As this oxide is a variable quantity in every heat, it is difficult to put this theory into practice. It is stated, however, that two per cent. phosphor tin (containing five per cent. phosphorus), is the maxim amount of phosphorus to use. In the writer's opinion this is not borne out by practice, as the strongest phosphor bronze contains more than twice that amount of phosphor tin. An alloy of 90 per cent. copper, five per cent. block tin and five per cent. phosphor tin has been found to possess a tensile strength of from 38,000 to 42,000 pounds per square inch, with an elongation of 22 per cent. A wall of this alloy three inches in thickness withstood a water pressure of 5,000 pounds per square inch. In place of the phosphor tin, yellow phosphorus was tried, the formula used being: copper 90 pounds, tin 10 pounds, yellow phosphorus 10 ounces. The tensile strength of this alloy was 36,000 pounds per square inch. When the phosphorus was dropped to five ounces the tensile strength fell to 22,400 pounds, which speaks for itself.

MANGANESE.

This also is a deoxodizer for bronze, but it must be used in small quantities, not sufficient to discolor the castings. It strengthens the copper tin alloys, if used with discrimination, but it will do more harm than good if not, as tin seems jealous of all modern deoxidizers except phosphorus, and the writer has found that a combination of all these deoxidizers, in certain definite proportions of each, is necessary to obtain some results, because one will counteract the evil results of another, producing a perfect deoxidation of the metal, and at the same time also freeing it from weakening effects of hydrogen, nitrogen and sulphur. Metal so purified is entirely different to the ordinary bronzes, of the same composition and combines the strength of the yellow alloys with the casting qualities and golden color of the tin bronzes. An alloy of 90 per cent. copper, five per cent. tin, four per cent. zinc, one per cent. deoxident possesses the same quality of tone when cast into bells, as the standard alloy copper 80 per cent., tin 20 per cent. The elimination of these gases in copper is the secret of the superior strength of the modern bronze, and the reason why two alloys of practically the same composition—as shown by analysis—differ so much in strength, elongation, etc., is that the maker of the better alloy had discovered how to remove all the impurities in the metal. Consequently, when maganese only is used, it is not possible to obtain the maximum strength in the alloy, and to this fact must be attributed the failure of many brass founders to make a high-grade manganese bronze. Manganese and copper unite readily to form alloys provided the proper temperature is reached by the furnace. If 30 pounds of copper are alloyed with 10

pounds ferro-manganese the resulting alloy is white in color, and will give approximately the following analysis, copper 80 per cent., manganese 16.3 per cent., iron one per cent. In making manganese copper, it is usual to alloy them in the proportion of copper 65 per cent., manganese 35 per cent. When zinc, lead and aluminum are added a silvery alloy is formed, variously known as "silver bronze," manganese silver" or white bronze. This metal is superior in color to German silver, does not readily tarnish, and will resist most acids. When higher percentages of manganese are used, exceedingly hard alloys result. The writer has made them so hard that they will readily cut glass, and the glass will break along the cut. Manganese discolors brass and bronze. One-half of one per cent manganese copper is sufficient to discolor brass, and the color is dark brown, approaching black. It can be used to advantage in all yellow brass, but just sufficient should be used to color the castings a rich reddish brown. The improvement in solidity, strength and casting qualities is very noticeable.

CONCLUSION.

In conclusion the superior qualities of the modern bronzes depend upon the little things they contain. The small quantities of aluminum, silicon, magnesium, phosphorus, manganese, iron and occasionally sulphur, to these they owe the qualities which distinguish them from ordinary alloys. The content of copper, tin, zinc, lead and so forth are easily determined by analysis. The little things generally escape, or are considered of no consequence. The founder who seeks to imitate a superior alloy from analysis will be wise to pay more attention to the "impurities" than to the easily determined metals which form the body of the alloy, for the body is of no special value if the spirit is absent.

UNITED STATES.

LAST YEAR'S PRODUCTION OF COPPER, ZINC, SPELTER AND LEAD.

The following summaries of the copper, spelter and lead productions in the United States during 1908 are from statistics furnished by the Geological Survey:

The copper industry in 1908 showed a gradual recovery from the severe depression in the last part of 1907. Many producers that had greatly curtailed, or even suspended, production in that year, began again to increase output practically at the opening of 1908, and in spite of the low price of the metal nearly all the important producers of 1907 were in operation throughout most of 1908, and a few new companies began production during the year. The rate of production has been steadily increasing, and is now greater than at any other time in the history of the industry. It is estimated that the production of blister and Lake copper in 1908 from ores mined in the United States will be greater by about 50,000,000 pounds, or between 5 and 6 per cent., than that in 1907, which was 868,996,491 pounds. Production of total refined new copper by works in this country can not yet be given, but probably it will hardly equal the output of 1907, which was 1,032,516,247 pounds.

The 1908 imports of copper in pigs, bars, etc., are estimated at about 160,000,000 pounds, and in ore and matte at about 53,000,000 pounds. With addition for copper in pyrite, not included in above, the total imports may be estimated as equivalent to about 210,000,000 pounds refined copper, a decrease of about 13 per cent. from 238,031,320 pounds in 1907. On a similar basis the exports of metallic copper are estimated at about 660,000,000 pounds, the largest ever recorded, and an increase of about 30 per cent. over the 508,929,401 pounds exported in 1907.

The production of primary spelter from domestic and foreign ores in 1908 is estimated at 208,000 short tons, worth at the average price $19,656,000, as compared to 249,860 tons in 1907, 224,770 tons in 1906, and 203,849 tons in 1905. Imports of zinc ore comprised 23,500 tons to duty-free calamine (silicate ore), valued at $222,000, and 30,500 tons of dutiable ore (carbonate and sulphide) valued at $383,000. These imports, which were practically all from Mexico, show an increase of 15,000 tons over the quantities of the corresponding ores imported in 1907, which were 32,624 tons and 6,472 tons, respectively. The exports of zinc ore also show an increase, being 26,108 tons, worth $877,745, compared to 20,352 tons in 1907. The imports of spelter show a decrease of 50 per cent., being 894 tons, worth $85,000, compared to 1,778 tons in 1907. The exports of spelter show a marked increase, being 2,500 tons, valued at $238,000, as against 563 tons in 1907. The exports of zinc dross were 8,683 tons, in value $483,000, compared to 9,593 tons in 1907.

The total production of primary refined lead, desilverized and soft, from domestic and foreign ores in 1908, was approximately 391,000 short tons, worth at the average price $32,844,000, as compared to a production of 414,189 tons in 1907 and 404,699 tons in 1906. These figures are exclusive of an estimated output of 12,000 tons of antimonial lead, as against 9,910 tons in 1907. Of the total production, desilverized lead comprised 287,500 tons, as against 314,241 tons in 1907. The soft-lead production increased to 103,500 tons, compared to 99,948 tons in 1907. The increased output of soft lead accompanying a decrease in desilverized lead means apparently that Missouri retains the first place among lead-producing States.

THE IMPORTANCE OF REPRESENTATIVE SAMPLING

By CLARENCE B. WHITE.*

The tendency to-day of the commercial world, the various branches of the metal trade in particular, is to attach more importance to chemical analysis. As it is not usually feasible to analyze the material itself a sample representing the lot must be obtained. It is the writer's opinion that the obtaining of this representative sample is of far more importance than the analysis itself. The average chemist will invariably check up his results with duplicate assays on the same sample, but it is an entirely different matter to make results agree on different samples of the same lot.

A large manufacturer of crucibles obtained a shipment of black lead and on trying several barrels found them to be of inferior quality. In answer to a complaint the representative of the black lead house visited the crucible maker and suggested they take a sample and have it analyzed. He then took a handful from the top of several barrels and claimed that it was about as fair a sample as could be taken. This was not agreeable to the other party who claimed that it was not a representative sample. His contention in this respect was correct, as it is a fact, although not generally known, that this material during a long railroad journey with its continual jarring will allow the poor and heavier material to settle to the bottom of the barrel and the best to rise to the top. It is possible for the material on top to be 10 per cent. better than at the bottom, which would make a difference in the neighborhood of a cent a pound.

It is a simple matter, however, to obtain a fair sample of material in this form that can be readily mixed and quartered in the customary way.

A far more difficult problem is the sampling of a

*White & Bro., Copper Smelters, Philadelphia, Pa.

body of material which cannot be handled. It is possible to do this as is shown by the following instance. A prominent exploration company was investigating a property and sent their engineers to take a sample of what was practically a mountain of ore. Upon analysis the sample drawn yielded 3.98 per cent. copper. On the strength of this millions were spent in developing the property, building the mill and smelter. After six months running a net return was made on the ore worked and showed a yield of 4.02 per cent.

Another case of sampling which was also remarkable, only in a different way, was an incident in which a concern had an accumulation of tin dross of which they wished to dispose. They invited four smelters of this class of material to bid on it. They examined the material, took samples, tested them and made the following offers per pound: 3¾c., 7⅝c., 9½c., 10⅝c. A greater disparity even than this was witnessed in the bids received by the government at the sale of a thousand tons of brass ashes last year, when the lowest bid received was $2.75 per ton and the successful bid was $22 per ton. It is probably true that both these bids were made on samples taken from the same pile.

SOLDERS AND BABBIT METALS.*

By Jos. H. Hart.

Probably no field of physical investigation offers more opportunity for interesting and important results than the study of alloys in general. In the various branches of the subject of alloy production, there has been to date more or less dependence on lucky discoveries of combinations of metals which possess peculiar and valuable qualities for various uses. In the field of fusible alloys and solders there has been a corresponding lack of scientific production and in view of the enormous quantities of such metals used and the importance which the subject holds in the mechanical world this is a state of affairs that should not long be allowed to continue. One reason for the unsettled conditions in this field, however, is that new metals from a chemical viewpoint are constantly becoming available. The fact that almost any chemical element can be used in alloy production presents great possibilities and complicates the situation as well.

In the evolution of solders combinations of tin and lead are the chief reliance, with the addition of various other metals or substances to suit local conditions and individual requirements. A large proportion of lead has the advantage of cheapness, while the use of tin strengthens the alloy but increases its cost very greatly. Lead is the cheapest of metals, with the exception of iron, but cannot be used alone because of its brittle qualities. The more lead above 40 per cent. an alloy contains, the higher will be its melting point, while the peculiar situation exists that as the proportion is lowered below this percentage the melting point will also be raised. This is largely the result of chemical action which takes place at this temperature. If bismuth is added, the melting point is still further reduced. Bismuth possesses the property of expanding on cooling, a property peculiar to itself among metals, which makes it suitable for use in positions where expansion and contraction of a composition with varying temperatures is undesirable. The addition of cadmium reduces the melting point still further.

A good method for finding the melting point of an alloy with a low melting point is by fastening it to a wire, or string, if the temperature required is not too high, and suspending it in a bath of water. If the temperature required is above the boiling point of water (212 deg.) melted paraffin can be used. This latter substance is likely to affect the chemical composition of the alloy to a greater or lesser extent.

Hard solders sometimes contain more or less copper. A good white hard solder contains copper 60 per cent., tin 20 per cent., zinc 20 per cent., and this does not possess any lead whatever. A fairly easily melted yellow hard solder contains about 45 per cent. copper and 55 per cent. zinc. This is in reality a brass, but is sometimes used as a solder for binding and filling purposes. Alloys of copper and tin alone will show a better resistance to acids and alkalies than those containing zinc. So-called aluminum solders are combinations of tin and aluminum, 15 to 20 per cent. aluminum, with a small percentage sometimes of nickel. A list of boiler plug alloys, alloys for casts, etc., contains some alloys which may be used for solders, but in general they find their application in other fields.

In regard to the methods of applying the different solders, especially those consisting of tin and lead, this is a subject which is almost untouched from a scientific standpoint. Comparatively little attention has been paid thus far to such properties as resistance to strains, conductivity, prolonged and unusual temperature conditions, etc. During a number of experiments made recently along these lines in one of the leading engineering colleges, it was found that any pressure whatever upon the solder at the moment of setting greatly reduced the strength of the joint. When making a solder joint, therefore, the upper piece should be supported above the lower one, the solder to be fused by means of one or more blow torches and the pieces brought together very gently. This is quite different from the usual method known as sweating, but is in line with good scientific theory and chemical data in regard to such materials. Pressure or strain at the time of solidification was found to break down very greatly the internal structure of the solder and produce crystallization, and the joint obtained possessed much less resistive qualities. Another interesting point brought out was the fact of variation with time of the tensile strength of the joints. The maximum strength attained under any circumstances does not exceed 27,000 pounds per square inch, and was obtained with a solder made up of three-fifths tin. This solder is very strong, but also very expensive for general use. The average time of each test was about 20 seconds, and was carried out with the ordinary strength testing machines used for such purposes, and with the engineering materials usually obtainable in the ordinary engineering laboratory. A decrease of 5 seconds in this time of testing would increase the tensile strength to considerably over 30,000 pounds to the square inch, but for all practical purposes such tests are unsatisfactory or unreliable, since in actual conditions such pressures or tensions last for a much longer time, when they occur at all.

Solders behave under constant strains very much like soft metals, or semi-fluid materials. They yield to an amazing amount under stress. Their fluidity resembles somewhat that of tar or gum and their distortion with time is much greater than would be supposed. The tensile strength was also found to vary with composition of the solder as well. Thus it was found that the tensile strength increased with the percentage of tin present and the entrance of this factor serves to complicate the situation still more. Thus a solder possesses its maximum tensile strength with 60 per cent. tin, showing this

*Compiled from a paper on Engineering Alloys, Chemical Engineer, June, 1908.

property as analogous to that of the melting point, and dependent upon chemical composition as well.

In engineering work fusible alloys are used, as steam boiler plugs, in electric wiring for short circuits, for delicate castings and for filling in flaws in ornamental castings. Banca tin is required by the U. S. government for boiler plugs, but a cheaper material can be used with equally good results under ordinary circumstances. Wood's, D'Arcet's and Rose's alloys are used for short electric circuits and for current interrupters. By a little careful study of the various combinations, an alloy may be produced having a melting point at practically any desired temperature within wide limits. Wood's and D'Arcet's are suitable for soap moulds, while the expanding alloy is used for filling in defective places in castings, and is somewhat similar to "Smooth-on" in its action. Type metal, pewter, stereotype metal and a large number of others are manufactured under trade names. Additions of phosphorus, arsenic and silicon give special properties which fit them for special uses. The great majority of non-metals used in alloying have a tendency to render more brittle the material with which they are compounded. Sometimes they affect the variation of its properties with heat to a marked degree and this latter is seen in the various alloys containing a small percentage of impurities and used for tool-making purposes, etc.

A rather interesting development has arisen recently in the use of fusible metals for fire extinguishers, such as are used for automatic sprinkler devices. It has been found that whereas these automatic sprinklers operate very satisfactorily at the temperatures as quoted, the temperature at which the metal will fuse is not low enough to permit of sufficiently prompt action to insure minimum loss. A recent fire in a New York City department store's fur storage room is a case in point, where the loss sustained was over a half million dollars before the plugs connected with the sprinklers were fused. The difficulty here is in getting an alloy with sufficient tensile strength to withstand the stress with time and at the same time fuse at a comparatively slight increase in temperature.

This represents merely one of the modern applications of fusible metals and solders in which the results do not entirely meet the expectations or satisfy conditions. The entire subject is fraught with interesting possibilities to the student of the subject. The physical properties of alloys and metals in combination are so variable and pronounced that the work, as has been said, has but just commenced. This development will be more rapid in the future than it has in the past and much greater reliability can be placed on commercial work employing these processes as a result of the scientific investigations which are going on today.

SILVER IN INDIA.

India Beginning to Make Exportations of White Metal.

United States Consul-General William H. Michael sends from Calcutta the following information concerning the traffic in silver bullion:

Mexico's public notice that she will accept offers of 5,000 kilos of silver weekly until further notice has aroused considerable interest in India. The imports of silver bullion into India at this time are enormously heavy. This is due to the slump in prices of silver. The price at the beginning of the year in Bombay was 70 rupees ($22.71), but it has dropped to 62 rupees ($20.11), which is considered low, and the result is that Indian operators have turned away from opium, linseed, and government paper and have concentrated their energy on the white metal. Referring to the situation in Bombay the Advocate of India says:

"The banks are therefore doing good business, and, as Bombay will be an important silver market in the future, considerable amounts of supplies will be maintained in this market, and our active banks are taking the necessary steps to cope with the new developments. The storage of silver in Bombay is taxing its safe accommodation, and all India is watching the new and hopeful developments in the bullion markets. It is stated that for the first time India will export silver to London next month, and that this new business will yield considerable profits to the shipping and insurance companies. Looking at the changed position of the market the existence of large stocks in India is becoming a necessity."

It will be noted with interest that for the first time India will export silver to London beginning next month. This shows that enormous quantities of silver have been hoarded up in this country, which is being turned loose for the large profits in sight.

COPPER IN TURKEY AND SMYRNA.

Copper kettles, plates, pans, pots, etc., are indispensable in every Turkish household, not only in the poorest country hovel, but also in the tents of every nomadic tribe which wanders over the plains of Asia Minor. They are all hand made, and form one of the chief articles of sale in every bazaar in this country. Asia Minor is a land which is very rich in copper ore, and if modern methods of mining were introduced the output could be greatly augmented.

In Tocat it is smelted in the most primitive kind of earthen ovens. There are also some mines in the immediate neighborhood of Tocat. Another district which produces copper is that which lies behind the city of Trebizond. The mines of Gummushhane, Matchka, Kerasunde and Karahissar, it is claimed, produce first-class qualities for kitchen utensils. The coppersmiths of Trebizond are well known throughout Turkey for their skill in working copper, and the bazaars of Constantinople and Smyrna are stocked with the best specimens of their handiwork. Another district rich in copper is that about Sinope, where no less than six mines are now being operated.

EXTENT OF IMPORTATIONS.

The quantity of copper imported into Smyrna amounts to 100 tons annually. It reaches this market in the shape of round sheets of different sizes, and none of it comes from Turkish copper mines. The trade in this section is supplied by England and Germany, while small quantities come from France and Italy. The largest dealer in Smyrna states that he attempted to import his supply from America, but the freight rates did not suit his convenience. The copper imported from Europe is used only in the manufacture of utensils, and prices are regulated by the New York and London markets.

This year copper was imported into Smyrna at prices ranging from $338 to $363 per ton. The prices of the various utensils can not be given, as they differ according to size, shape and weight of the object. Coppersmiths of Smyrna are very skilled and make many fine utensils, such as old-fashioned toilet vessels, etc. One of their specialties is the making of large and ornamented charcoal burners for the halls of the better class oriental home. A good burner of this class, artistically designed, will cost from $15 to $20. Old worn-out kitchen utensils are sold as old copper at 34 cents the oke (2.82 pounds), reduced to oxide of copper, and shipped to French traders who sell it to the natives of Algeria as a toilet article.

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ADVERTISING RATES ON APPLICATION

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CONTENTS

ANNOUNCEMENT.

Early in September there will be published in London an English edition of THE METAL INDUSTRY, which edition will circulate in Great Britain and all of the British Colonies, except Canada.

Beginning with our August number all English and Colonial subscribers (except Canada) to THE METAL INDUSTRY will be taken care of by the London office.

The English paper will be similar to the present American edition of THE METAL INDUSTRY, but will also contain English news, English market reports and English advertisements. For all American manufacturers of metals, machinery and supplies who desire to reach the British and Colonial markets, the English edition offers an exceptionally good opportunity, for no American publication can begin to interest English readers like a journal published in the United Kingdom. As there is no tariff wall in Great Britain, American manufacturers have an equal chance wth the British. Therefore, through the advertising pages of this English edition American manufacturers can reach at the least cost the metal industries of Great Britain and her Colonies. Further particulars are furnished by the New York office of THE METAL INDUSRTY.

PLATERS' TROUBLES.

When the National Electrotypers' Association was formed last April, it was predicted that nothing but lasting good could come of such an organization. In response to the earnest appeal of Charles H. Proctor for "Mr. Plater to come out of his shell," numerous "Mr. Platers" have crawled out and a large number in addition have opened their doors and are listening, until at the present writing the association bids fair to become a power in the land and will be a most important factor in the development and uplifting of the electroplating and allied industries.

The first results making for a wider and clearer understanding of the troubles that beset the plater, are to be seen in the recent discussion on "THE EXCESS OF ARSENIC IN A BRASS BATH," at the last meeting of the association held on June 25, and described in the Association and Soceties column in this issue. We also publish the paper read by Percy Brown, which sets forth in a scholarly and scientific manner the essential points of the subject.

In addition to the above a discussion was started and will be continued at the next meeting on the "SPOTTING OUT OF PLATED ARTICLES." Some of the methods resorted to by the platers most troubled were very ingenious and showed that considerable study had been devoted to the subject. As this ques-

tion will be taken up at the July 16 meeting, we will omit any further reference to it here and promise a comprehensive résumé in the August number of THE METAL INDUSTRY.

As a possible expansion of the field for the influence of the association we might mention a subject which is now seasonable and also of vital importance to all factory workers. We refer to the matter of ventilation, not only of plating and buffing rooms, etc., but of all places where a number of persons are confined for definite periods in the performance of their daily work.

THE METAL INDUSTRY has already published several articles on this subject, particularly in regard to plating rooms. One of these, written by B. W. Gilchrist, secretary of the Platers' Association, appeared in the June number and is followed in this issue by a little more comprehensive treatise. There is no subject of more vital importance to mankind than public health, and any effort made individually or collectively towards the betterment of existing conditions can never be considered as wasted.

The subject is so broad and the methods of improvement so many, that it is difficult in limited space to single out any distinctive way of procedure. Each case is a proposition on itself and must be worked out according to local conditions.

In this connection we cannot do better than to quote from a recent publication of the New York Blower Company:

"Air is vital to the preservation of life and health. Its purity is a direct measure of the physical well being. It has been calculated that an average individual inhales 2,600 gallons of air in twenty-four hours, or about 34 pounds in weight—as against 5½ pounds of food, both liquid and solid. We should therefore even more carefully scrutinize the air we breathe than the food we eat to see that it is not adulterated. But the latter is visible and its quantity easily determined; the former is invisible and intangible. The digestive organs have, furthermore, the faculty of selecting the good and rejecting the bad, but the lungs, which are infinitely more delicate and sensitive, have far less selective power. Whatever quality of air is inspired must pass through them before it is expired. Insufficiency in quality must be made up by excess in quantity.

"The proportion of carbonic acid—the primary product of respiration—has long been recognized as an index of the quality of the air. But it has been a matter of discussion whether the ill affects of air containing a large proportion of this gas were due directly or only indirectly to its presence. By some experimenters it has been asserted and apparently proven that the exhaled breath contains a poisonous compound—inoculation with which might even produce death. The best opinion now seems to be that the injurious effects of air high in carbonic acid are due almost entrely to the decreased quantity of oxygen and not to any poisonous organic matter from the lungs. But vitiation, resulting from insufficient ventilation, is almost universally accompanied by increased temperature. The primary cause of discomfort is therefore twofold, resulting as it does from decrease of oxygen and increase of heat.

"But this by no means indicates that no other harm may exist in expired air, or that the requirements of good ventilation may be satisfied by merely supplying a specific volume of air to dilute that vitiated by breathing and to thereby limit the percentage of carbonic acid which may be present." Now if we add to the natural exhaustion and contamination of the air by the respiration of individuals the poisonous fumes and gases from the various chemical solutions in daily use, the conditions become worse to an enormous degree.

Again in connection with the natural deterioration of the air in a buff or polishing room is the important matter of dust. "The quality of air is also measured by the presence of minute particles of dust which may either be directly harmful in themselves or may serve as carriers of yet smaller particles of micro-organisms, which may be objectionable not only because of the amount of dirt they represent but because of their physiological effect. In either form this dust may and usually does include bacteria which may form the really dangerous elements in the air.

"But far more important are the living germs, the microbes, bacteria, fungi and molds which are especially abundant in populous places. In a single grain of dust from his laboratory Miquel found 750,000 germs, and in that from a room in Paris no less than 2,100,000. The dust of a hospital ward in St. Louis contained from 36 to 46 per cent. of organic matter. In the air of an ordinary room the number was eight times, and in the hospital twelve times that in the open air. Even the dust of clean habitations tends to reduce the vitality and gives extra work to the breathing organs.

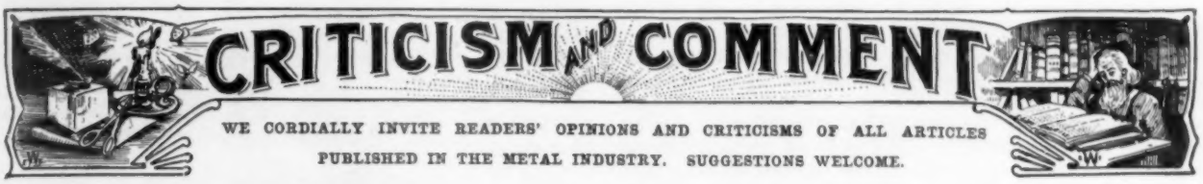
"Many severe forms of disease, especially of the respiratory organs, are caused by the dust inhaled in various trades and occupations. Aside from the humanitarian aspect many industries require purity and cleanliness of air for success in their manufacturing processes," and in a good many cases we find extraordinary precautions taken and no expense spared to obtain the best results so long as it has a bearing on the MANUFACTURED PRODUCT. But how often do we find apparent disregard where the health of the help is concerned!

Of course a great deal of good work has been done and improvements in factory conditions are being made all the time, but as has been said before, the question is so wide and the field so large that only determined and continued effort will produce model conditions.

The MUSEUM OF SAFETY AND SANITATION has recently opened an executive office for the administrative and promotive work of the Museum at the United

Engineering Societies' Building, No. 29 West 39th street, New York.

Plans are being pushed forward along practicable lines to prevent the enormous loss of life and limb to American life and labor, through the Museum of Safety devices for dangerous machines and preventable methods of combating dread diseases may be exhibited. Charles Kirchhoff, editor of The Iron Age, is the chairman of the Committee of Direction; T. C. Martin, editor of The Electrical World, vice-chairman, and Dr. William H. Tolman, director. The work of this Museum may well include this question of ventilation and sanitation of industrial establishments. THE METAL INDUSTRY will be glad to hear from any of its readers on this subject and offers its hearty support in the promulgation of any plans and ideas.



"MOLDING MACHINE PITFALLS."

To the Editor of THE METAL INDUSTRY:

We have before us a copy of your May issue, containing the article on "Molding Machine Pitfalls." The writer of this article is evidently quite well posted on molding machines and we heartily agree with him in his statement that the simplest and cheapest machines are usually the best.

The plain squeezer with a pneumatic rapper which he refers to as selling at $55 is one of our machines, but the price of the rapper has lately been reduced from $25 to $15 so this machine now sells for $45. We recommend as preferable to this, however, the portable type of machine which costs $5.50 more and also a side shelf which adds $2 to the price. We manufacture automatic molding machines ourselves, but are honest enough to admit that in 99 cases out of 100 our plain press which sells at from $29 up, according to size and equipment is a more useful machine than the automatic which sells for $225 to $300.

We would add to the list of "Pitfalls" mentioned in this article the use of poor snap flasks, as we have seen a large number of foundries have trouble with molding machines on account of using weak or poorly fitted snap flasks. It is a very poor economy to buy a cheap snap flask or use a bottom board for a press or board.

Bottom boards should be heavy and should be small enough to enter the flask easily when the mold is pressed. This gives the mold a true surface on top and if the snap weights are planed as they should be they will rest evenly upon the mold.

The list of "Don'ts" in "Pitfalls" is good, but we ourselves have discontinued sending out machines on trial, as we consider our machine a standard product and in common enough use to remove the necessity for demonstrating that it will operate satisfactorily. We realize that there are many foundries in which no machine will operate satisfactorily on account of labor troubles, but we do not feel that this should necessitate our taking back machines, as would be the case if they were sent out on trial. We are glad to note the increasing interest in molding machines and hope that before many years the opposition to them will have disappeared. THE ADAMS COMPANY,

Dubuque, Iowa, June 29, 1909. GLENN MUFFLY, Sales Agt.

HEALTH CONDITIONS IN PLATING ROOMS.

To the Editor of THE METAL INDUSTRY:

While reading through your last edition I came across the article "Health Conditions in the Plating Room," by B. W. Gilchrist and think it is about time somebody woke up to the fact that a large percentage of the plating rooms in New York City and elsewhere are filthy, unsanitary and unfit for men to work in day after day breathing in an atmosphere laden with the fumes of acid dips, hot cyanide solutions, etc. I have seen factory inspectors pass through plating rooms taking little or no notice of the above conditions, seeming to think that if there is an exhaust fan somewhere in the room it is all that is necessary. Now these men should know that the fan or fans must be of the right size, run at the right speed and placed in a position so that all the fumes can be carried off as fast as they are formed.

Another thing platers have to contend with in a good many shops is wooden floors always wet and soaked through with cyanide solution and other poisonous matter, giving them sore feet and otherwise ruining their health, where properly drained cement floors could be had at small cost to the owners.

I hope that the platers as an intelligent body of men will get together and work for better conditions in the plating room, which should be of interest to the employers, for a healthy man working under good conditions can do more and better work than a man handicapped by ill-health and bad conditions.

New York, July 8, 1909. PLATER.

ECHO OF THE FOUNDRYMEN'S CONVENTION.

To the Editor of THE METAL INDUSTRY:

Your Convention, or rather Post-Convention number, is most excellent, and shows what a really big time we had. Those in it, the busy ones, do not see this as well as the editors who do nothing but stroll around picking up points (!)

I agree fully with your criticisms, and would only be too glad to make the necessary corrections, but there are so many factors that interfere. Thus to have put the meetings away from the exhibition would have meant empty chairs. You remember Toronto on this. To send the papers around before the convention is right, if we had them to send in time. As it was I got the last batch the second day of the meeting, the printer being busy night and day on it. I still have three papers to get into print, and another which I probably will not get at all. Then—and most important—our foundrymen are not yet advanced up to the point where they can be treated like a meeting of engineers. The latter usually ask right out and state their criticisms. The foundrymen are, however, very backward and only ask questions, but seldom criticize. However, that will all eventually come right as the younger element get more to the front.

As to the joint meetings, I had arranged the programme so that each session was half for one association and half for the other. The coming in and out, I fear will never be stopped, as the exhibition attraction is too great.

So my best thanks for the points, and we will see at Detroit in 1910 what we can do. RICHARD MOLDENKE,

Watchung, N. J., June 17, 1909. Secretary A. F. A.

IMITATION SILVER DEPOSIT.

To the Editor of THE METAL INDUSTRY:

Having noticed many inquiries from time to time in THE METAL INDUSTRY pertaining to imitation silver deposits I thought a little information on this subject may be of some value to the readers of your paper.

A solution that I have used for producing this finish is as follows: Into fifty gallons of ordinary nickel solution stir four ounces of C. P. carbonate of magnesia, then add eight ounces of muriate of ammonia and eight ounces of single nickel salts; then take two gallons of this solution, let it come to a boil, and add one-half pound of crystallized boracic acid, stir well, and when it is all dissolved allow it to get cold. Now stir it into the other forty-eight gallons of nickel solution. Let solution stand over night and it is ready for use. Use cast nickel anodes, also one pound of cadmum sticks as anodes put between the nickel ones. This solution offers little resistance to the electric current, so in order to get a deposit that is nearly as white as silver the current must be properly regulated.

HERBERT W. CUMMINGS.

Abstracts

A REVIEW OF FOREIGN METAL PUBLICATIONS.

INSTITUTE OF METALS.

ABSTRACTS FROM DISCUSSION OF PAPERS READ AT INSTITUTE OF METALS.*

By Our Birmingham Correspondent.

Professor Turner said the object of the Institute was to enable the scientific man to bring his information for the practical man and the latter should bring forward the suggestions arising from his experience. It was very desirable that students should devote their studies to subjects likely to be of practical service. A great deal of time was wasted by the opposite course. The Professor caused some amusement by a relation of his experiences in view of the statement made by Sir Gerard Muntz that "the scientist was embowered in that cloistered seclusion which allowed of consecutive thought and the reasoning out of obscure and difficult subjects." He could assure them that very little of his own time was spent in "cloistered seclusion." Various speakers urged the necessity of the standardization of metals.

The discussion next turned on Mr. J. T. Milton's paper on: "Some Points of Interest Concerning Copper and Copper Alloys." Mr. Seaton urged the importance of taking time in the various operations. He thought that was the explanation of the high quality bronzes produced by the ancient Peruvians and Egyptians. They succeeded in producing therefrom tools capable of cutting hard substances. It was well-known that the introduction of sulphur rendered copper "cold-short," while two parts of bismuth in a thousand would ruin the best copper. So small a quantity as .1 would render it in some degree bad. As to the use of lead, a small quantity enabled the bronze to cut better and produced a richer color. Very important elements were the even and rapid cooling which might be done effectually by plunging in oil at a temperature of 300 degrees, followed by cooling.

Mr. Tomlinson gave instances of what he called "alarming cases of corrosion," in which tubes had been honeycombed. It was clear that these were not due to impurities. Such cases appeared to be due to local causes not always apparent.

Professor Gowland believed many cases of extreme brittleness were due to the annealing being carried on in a smoky atmosphere which removed the oxygen, and changed the molecules. There was a definite and critical temperature which needed to be maintained for a certain period to give the requisite strength. As to the ancient bronzes he had proved by analysis that they contained all sorts of impurities, but their hardness was solely due to hammering, which could be just as well carried on in the present day. Lead was used because it enabled bronzes to be cast at a lower temperature, and to take the specified pattern required. Bearings had also been benefited by the addition of 2% of zinc to the copper and tin. Cases of unsound castings he had met with were due to the presence of sulphur. The speaker gave details of the corrosion of locomotive tubes, of a 70-30 composition, on which an incrustation of copper chloride was found. It proved to be due to some of the coke used being exposed to the action of sea-spray. Mr. Pearce gave instances to show that corrosion did not come from impurities, but rather from the prevalent ignorance with regard to the treatment of the metal.

Mr. Walter Rosenhain pointed out that certain combinations of metal, as well as the introduction of shavings or fragments, might set up an electric current, and consequent galvanic action quite sufficient to account for corrosion. He thought Mr. Seaton exaggerated the importance of time in the production of the ancient bronzes. In many branches of metallurgy the influence of time was a very debatable point; indeed there was much evidence to show that unless metal had severe treatment, it would continue in the condition in which it left the hands of the metallurgist.

*London meeting.

Mr. Milton briefly replied, stating that in many cases Muntz's metal would not last so well as copper, and was apt to go rotten in a short time. Engineers usually agreed that metals with large crystals were not so reliable as those with small crystals, yet he had known phosphor-bronze with immense crystals three-eighth inch diameter which stood the test well, and showed a great deal of ductility. Brass founders showed a decided liking for lead, but for boiler mounting it should be absolutely prohibited. The tradition as to the value of lead needed to be obliterated.

Most of the evening meeting was devoted to the study of aluminum in connection with the paper by J. T. W. Echevarri on "Aluminum and Some of Its Uses." Mr. Ristori said the history of aluminum had been more or less of a romance. He remembered when it was 55s. a pound and the whole output for a year was something like three tons. Now it was nearly 30,000 tons. It had been his own luck to be connected with it from the beginner as a pioneer of the metal. There was hardly anything which could not be made as cheaply with aluminum as with any other metal. The speaker pointed out the great importance of the lightness of aluminum for military equipment. Mr. Philip regretted that it could not be made available more largely for shipbuilding, because of its liability to destruction by sea-water. He had seen extraordinary instances of corrosion. After remarks by Dr. Carpenter, Mr. Echevarri, replying to questions, said they could supply plates for shipbuilding 6 feet wide, by 15 or 20 feet long, up to ⅜ inch. thickness. Mr. Morrison dealt with aluminum for electric wires, the metal, he said, being cheaper and quite as good as copper, but the problem of soldering was a very serious one. A number of solders had been on the market and he should think one was invented every day. But there was a decided advantage in autogenous welding. The speaker gave some details of the process. Mr. Milton suggested that where large plates were required they could easily be rolled down by such mills as were now used for steel.

Mr. Defries gave an experience of the flavoring of drinking water by an aluminum flask but Professor Huntington had not had a similar experience, though he had used a hunting flask for years. Mr. Boeddicker pointed out that occasionally drinking vessels collapsed without any very apparent reason. They needed information also as to the relation between temperature and tensile strength. Professor Turner said an enormous number of patents had been taken out for solder in France, Germany and America, as well as in Great Britain. He had been repeatedly applied to for information with regard to solder, and if a satisfactory method were discovered it would go a long way toward popularizing the material.

Mr. Seaton described experiences with copper aluminum for boiler mountings. He got strong castings, but they were so porous as to be useless. The crystals were in a long needle-like form and the structure looked too much like a basket to suggest water-tightness. He experimented with sea-water of the true Atlantic mixture and washing soda, but the soda was the most trying to the metal. On the whole, aluminum had been a disappointing metal for engineers. The metal would be much more largely used in view of its lightness if it could be got sound. He thought that the solution might be found in its use in combination with one of the rarer metals, just as iron had been enormously improved by very minute additions of such metals. Mr. Johnson said that his experience with aluminum was that if they used mineral oils the metal showed a tendency to weep excessively. It was better if they used a vegetable oil like colza.

The chairman added a few remarks suggested by his shipbuilding experience. The metal had always proved unsatisfactory on the side of corrosion, though it was attractive from the point of view of its lightness. Installations which were high up in the ship were satisfactory; but in France, America and Great Britain the metal rapidly destroyed under the action of sea-water. It was only useful for yachts where the lifetime of the vessel was of

no consequence, so long as the race was won. It could only be used to a limited extent. Of course, everybody desired to use it on the score of lightness. Mr. Echevarri, replying, said that during the last 18 years they had made a number of aluminum bronze propellers for the admiralty in Great Britain and France and he had never come across a case of corrosion or heard of one. They could really furnish plates up to any size required and they could be rolled in any mill. It was possible to obtain a tensile strength of 16 to 18 tons per square inch with a metal which could be bent at right angles.

The concluding session gave considerable time to the paper by Mr. Philip on "Some Notes on Phosphor Bronze." Professor Huntington said that as analysis involved a good deal of time, he had used extensively the metallographic method of determining the amount of phosphorus and he had found the result a sufficient approximation for practical purposes. The results were very close indeed and entirely reliable. The speaker expressed his surprise that the addition of phosphorus would have had any beneficial effects from the point of view of elongation. Generally speaking, phosphorus acted in two directions, the most important of which was in the removal of oxygen. It was the oxides which caused the metal to cast badly, and to develop mushiness. Phosphorus was beneficial in forming a compound with oxygen which in itself was fluid. Mr. Seaton considered that phosphor-bronze had been more or less disappointing to engineers, who 25 years ago expected great benefit from it as a bearing metal. But they soon found that it could not compete with white metal for large shaftings. He had experimented with bearings for Atlantic steamers, and they found that the bearings got hot and were considerably worn while underneath was a deposit of phosphor-bronze sand. There was no doubt that when they got a close grained metal they got some very fine castings from phosphor-bronze. But he noticed excellent results were got from metals, showing only a trace of phosphorus. That seemed to show that the only value of phosphorus was to "doctor" the material.

Mr. Billington gave a few practical hints from his experience in the casting of bronze. He thought it mattered very little whether the alloy contained a large or a small percentage of phosphorus, but the temperature was critical and all-important. His impression was that much of the brittleness of phosphor-bronze came through intermittent pouring. If the receptacle was a tapering vessel of the tun dish pattern it was difficult to keep it filled while pouring, and oxygen and slag was apt to get in during the process. But if the receiver was made larger, and with a flat bottom so that it should be kept full, the oxygen and slag were kept out. To illustrate his point the speaker drew on a blackboard a sketch of a receiver, resembling an inverted tall hat with a pipe inserted in the crown. His firm had been making phosphor bronze for forty years. They got far better results from lead bronze than tin bronze.

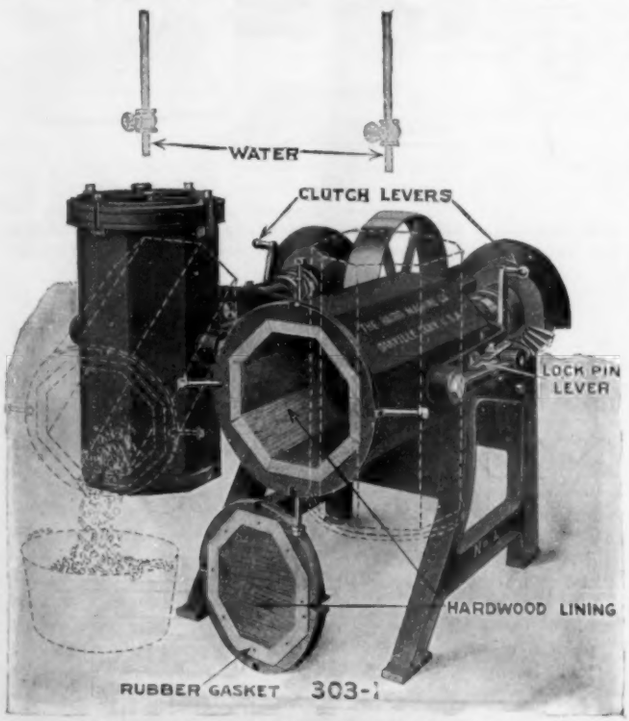
Mr. Law mentioned that he was astonished to find how little had been written on the subject. He was writing a book on "Industrial Alloys."

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

BAIRD DOUBLE HORIZONTAL TILTING TUMBLING BARREL.

A new form of tumbling barrel for the polishing of small articles by means of steel balls is shown herewith in the cut.



NEW BAIRD TILTING TUMBLING BARREL.

This type of tumbling barrel is largely used for imparting a good highly polished surface to such articles as electrical goods, typewriter, adding and similar machine parts; buckles, hose supporter and suspender trimmings; corset eyes, chains, collar buttons, pins, rings, and other jewelry; ladies' bags and purse ornaments; cabinet, fancy hardware and flat metal or stamped articles of all kinds. The articles are tumbled in these machines along with steel balls, which burnishes them before plating or polishes them afterward, and for such work has proved very efficient.

The simplicity of operation of these machines as well as their efficiency is something that must appeal to every manufacturer of small metal articles. The barrels are pivoted near the center of their length and are positively held in the forked shaped bearing in a horizontal or operating position by a lock pin which engages a recess in one side of the barrel near the bottom end. A slight push on the lock pin lever, shown, instantly disengages the pin, when the barrel can be tilted. Simply loosening the cover bolt nuts, and throwing back the bolts, enables the cover to be removed and the barrel can then be instantly tilted or turned bottom up to dump the articles, then reversed and refilled. The entire operation takes but one or two minutes.

These barrels are made by the Baird Machine Company, of Oakville, Conn., manufacturers of dies, special machinery, foot and power presses.

The specifications for the barrel follows:

Size of barrel (inside)	10½ ins. diam. x 24 ins. long
Clutch pulley	20 ins. diam. x 4 ins. face
Speed of clutch pulley	120 to 140 R.P.M.
Speed of barrels	60 to 70 R.P.M.
Proportion of gearing	2 to 1
Floor space (side to side, and front to back)	46 ins. x 57 ins.
Net weight	1,300 lbs.
Gross weight, boxed for export	1,575 lbs.
Dimensions, boxed for export	4x4x3-6 ins.
Code word	DHTUMB

A NEW PARTING COMPOUND.

Buckeye Parting is a new compound for parting molds for brass, iron, bronze and aluminum castings. The manufacturers claim for this article that it will neither cut, wash nor burn off the face of the mold.

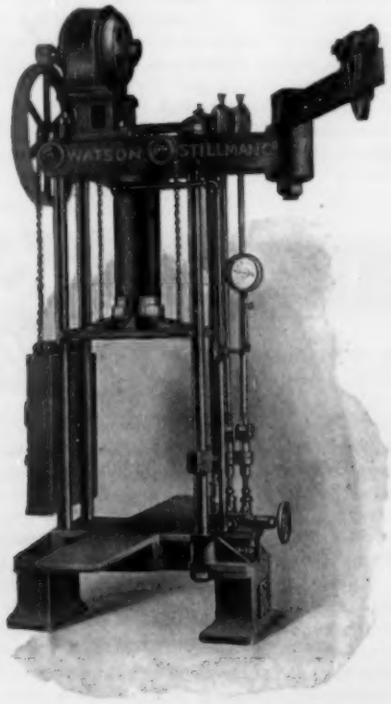
It prevents the sand from sticking to the pattern, and pro-

duces sharp, clean, clear, faultless molds—with every line, shape and conformation delineated precisely as in the pattern. It assures perfect lifts and draws, and entirely eliminates the necessity of ever patching the mold. It assures smooth, sharp and seamless castings. It saves time and labor in the grinding, finishing and polishing departments. In molding machine work, its use increases the production of castings 20 to 30 per cent.

Buckeye Parting is manufactured by The Buckeye Products Company, Cincinnati, Ohio, and a working sample will be sent upon request.

A NEW REVERSED CYLINDER PRESS.

A new type of reversed cylinder forcing press is shown in cut. The manufacturers claim for this press that it will prove a handy tool for pressing bearings and miscellaneous work. As will be seen from the illustration, a crane bracket and beam extending from one end enables the operator to swing a heavy



A NEW REVERSED CYLINDER PRESS.

piece of work onto bracket shelves extending out from each side of the bottom platen. These shelves, 30 inches long by 12 inches wide, are detachable, and can be lifted off and on jobs where they would be in the way and sufficiently strong to support any work that will go into the machine. They will be appreciated by those who have had to push castings or parts into place on the ordinary small platen.

The motor, mounted upon pedestals on top of the press, drive the pump shaft through single reduction gearing. A hand or belted drive is furnished if desired instead of the motor. On the other end of the pump shaft are two eccentrics each driving one of the pistons of a ¾-inch by 2-inch twin pump, for which the pedestal legs act as reservoirs. The operating valve is of the single screw stem type, connected to release the pressure from the work when opened, and start the ram down when closed. It will not retain the pressure unless the motor is stopped or the liquid driven through the safety valve. Other types of valves may be substituted to meet the special conditions. A gauge is furnished to read in tons or pounds per square inch, as desired. Literature descriptive of this and many other assembling presses may be obtained by addressing the manufacturers, The Watson-Stillman Company, 50 Church street, New York.

A galvanized iron sawdust box for drying-out is manufactured by E. E. Steiner, Newark, N. J.

KNURL HOLDER FOR TURRET MACHINES.

The accompanying cuts show a newly designed tool for holding knurls in turret lathes particularly. Fig. I shows a general view, Fig. II shows the tool in operation, and Fig. III shows a plan of the tool only. The tool consists of a shank made in different sizes to go into the turret in the usual manner, and a cross slide on which are mounted two arms that contain the knurls. The arms are moved in and out by means of right and left hand screws, thus obtaining a large range of sizes. The screw has a slot at either end for the use of a screw driver, and the arms are held from turning on the round bar by spline and keys, and when the proper size has been obtained the arms are clamped securely by clamp screws to main bar.

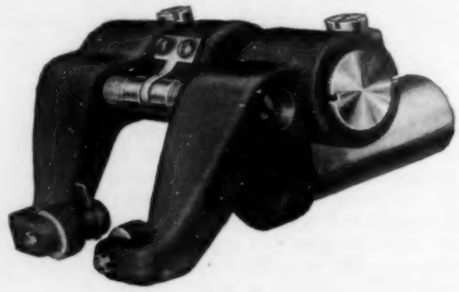


FIG. I.

The construction is novel, but not without method, as it has proven the best from several experimental designs. The leading feature in the design is that the round slide is set off to one

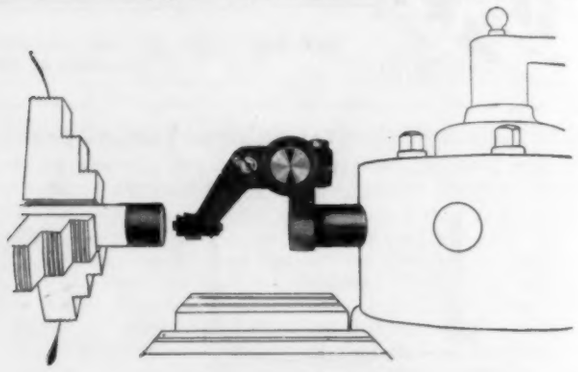


FIG. II.

side, the object being to leave the entire other side of the central axis free, which means that there will be little interference

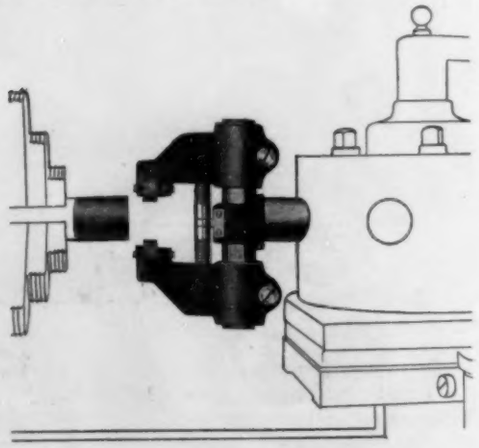


FIG. III.

from striking other tools. Earlier designs had the slides symmetrical to the axis, but the tool was frequently coming in contact with other tools.

The knurls themselves are standard, ¾-inch diameter, 3/16-inch wide and have a ¼-inch hole. These run on hardened pins, which are held in place by a spring dropping into a notch, and can readily be removed, or turned end for end, thus giving double wear. To set the tool for operation, the clamp screws on main bar are loosened, and with a screw driver the arms are moved to bring the knurls to the desired position. When this is obtained, the clamp screws are tightened up and the tool is run on the work after the fashion of a screw die. It is not intended that the knurls should be run in and out while in contact with the revolving work.

The main value of the tool lies in the fact of its having a wide range or large capacity, and in the fact that the knurls being set opposite it does not incline to push the work off to one side. In actual use it will be found advantageous to have the knurling done from the turret, as it leaves the tool post free for other tools, such as chamfering, or other irregular operations. Only one size is manufactured, as there does not seem to be any need for more. The capacity of the standard tool is that it will knurl anything from 0 up to 2½ inches diameter by 2½ inches long, and there are holes through the shanks. The shanks are made any size, from 7/8-inch to 1¼-inch. This tool is being manufactured and sold by The Graham Manufacturing Company, of Providence, R. I., who will be glad to answer all inquiries regarding it.

DUPLEX SHEET METAL CHAIN.

The Hatheway Manufacturing Co., of Bridgeport, Conn., have recently purchased the exclusive patent rights in an improved sheet metal chain which will be known to the trade as the Duplex Chain. It embodies the only real improvement ever made in this class of chain, the link being reinforced at its hitherto weakest portion by having the metal between the eyes folded back upon itself, resulting in the greatest possible strength with the minimum of weight.

Duplex chain links will stand more strain than other chain links of twice their thickness before straightening out, links work freely and will not kink. These chains are made of brass, bronze, or steel and can be furnished in any desired finish. A very attractive and useful sample will be sent to the trade upon request.

ELECTROPLATED STEEL STRIPS.

In consequence of the great and growing demand for superior electroplated articles in nickel, brass, copper and tombac finish, the manufacturing of metal goods has become more and more complicated. Most of the articles are first made of the raw material and afterwards have to be polished, plated, and otherwise finished by difficult and expensive processes.

The working of such material is therefore not as economical as it might be, and besides there sometimes are attending disadvantages owing to difficulties in refining the ready made articles. Furthermore, it is a fact that in many cases, the refining, polishing, plating, etc., of the articles is not calculated in the price to the exact degree that it should be.

It is therefore of great importance to the trade at large that there has been perfected a process for the electroplating of steel in very long strips. These strips can be finished in nickel, brass, copper, etc., in a highly polished condition, and by this material which is manufactured in a solid form, very good and economical work can be done.

This material is already used in great quantities in Europe and can be safely recommended to all manufacturers of sheet metal goods. It is manufactured by Hille and Müller at their several works in Düsseldorf, Germany, Porschdorf, Saxony, and in Schönau, Austria. This firm, by reason of their superior equipment in specialized machines, are able to suit every requirement. Nickeled, brassed, tombacked, or coppered zinc, steel and tin plates as well as brass sheets are made in any size and gauge, and samples will be gladly furnished.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

ALLOYING

Q.—Can you give me a formula for bronze castings that will have the dark chocolate color of statuary?

A.—A good mixture for statuary bronze is the following:

Copper	90	parts.
Tin	7	"
Zinc	3	"

This mixture gives castings that can be readily worked with a file, and on exposure to the atmosphere soon assumes a desirable patina or clear brown color.—K.

Q.—I want to make an alloy of gold and aluminum that will have the color of gold, be harder than aluminum and lighter than gold, for a dental plate.

A.—There is an alloy which is composed of 90 parts aluminum and 10 parts gold, which has a beautiful color, has a hardness of the corresponding alloy of gold and silver, and can be readily worked, rolled or drawn into sheet wire. We have no doubt but what this will answer your purpose. We are unable to say offhand just what the specific gravity would be, but as the aluminum is in the ratio of 9 to 1, the specific gravity of aluminum being very low, you can readily see that the metal will be extremely light.

This alloy is not attacked by the acid or juices of the mouth, and should make an ideal metal for the purpose for which you intend to use it. There is another alloy of 72 parts gold and 22 parts aluminum which has a rich purple color, but, of course, is much heavier, and is also much harder to work than the preceding mixture, to say nothing of the additional cost.—K.

BEARINGS

Q.—(1) I would like to have a cheap mixture for steel rolling mill brasses; they must stand the *heat* as well as the *wear*.

(2) How can I cast copper on the end of a steel rod without having the copper blow? I cast four pieces in a mold and pour fifteen molds with a pot of metal, so it would be impossible to heat the steel rods; the mixture I use is copper 80%, red brass 20%.

A.—Standard phosphor bronze is satisfactory for rolling mill bearings. It contains:

Copper	73
Lead	11
Tin	10
Phosphorus	1

It is unnecessary to use ingot copper, as scrap wire will answer. Where unusual heat is met it may be necessary to reduce the amount of lead somewhat. If in casting the copper mixture to which you refer, on the ends of the steel rods, you are unable to heat the rods, about the only thing you can do is to tin them. Pickle the rods until clean and throw into pure melted tin, using zinc chloride as a flux.—J. L. J.

Q.—We would ask if you can furnish us with a formula for a low-price grade of Babbitt metal, suitable for work on railroad box-cars?

A.—The best cheap babbitt for railroad work is composed of 87 parts lead and 13 parts of antimony. This babbitt has a fairly low melting point, so that it is fluid when melted, and runs well. If made from good material it is fairly tough, and can be peened without danger of cracking or breaking off of flanges. This for-

mula is used by the Pennsylvania Lines, West, and it is made from refined lead and Cookson's antimony, and all scrap or babbitt melted out of old bearings is sold that the babbitt may be kept standard. The P. R. R. uses the same formula, but has it made up from antimonial lead, and for this reason it contains about one-half of 1% copper and 1 to 2% of tin. This makes a cheaper mixture but not so uniform or reliable as when new metals are used.—J. L. J.

CLEANING

Q.—How can I clean the rouge off of eyeglasses after they have been polished?

A.—There are several methods whereby the rouge may be removed; first, by benzine and brushing with a regular painters' sash brush, and drying out in boxwood sawdust, or by boiling out in a solution of platers' compound, washing in boiling water, and drying in boxwood sawdust, or cleansing by the aid of a weak kalye solution.

For the manufacturers of these compounds, see advertising columns.—C. H. P.

DIPPING

Q.—Will you kindly publish a formula for a matt gold and silver dip solution?

A.—To produce the matt gold or silver finish, use the following formula:

Dissolve 6 ounces of sheet zinc in 1 gallon of 38% aqua fortis; when the zinc is all dissolved and the acid is cool, add 1 gallon of 66% oil of vitriol and mix thoroughly; then add 2 ounces of muriatic acid. Arrange to keep your dip quite warm by placing the jar in warm water. To produce the finish, clean your articles in the regular manner by potashing, then immerse the articles strung upon copper wires in the matt dip, keeping them moving all the time for a couple of minutes; now remove, wash well and pass through the regular acid bright dip, then wash well and gild or silver as required by the regular dip for the purpose. If the matt is too smooth, add a little more aqua fortis; if too coarse, add more vitriol. If the dip does not start to matt when first prepared, add a few ounces of water. Keep the dip well stirred up for good results.—C. H. P.

ETCHING

Q.—How can etched work be done on silverware and how is it oxidized?

A.—For etching silver the articles are coated with asphaltum varnish thinned with benzine; when dry the silver is exposed by any sharp tool, or the design is painted upon the surface for relief etching. The acid used for the purpose consists of pure nitric acid 1 part, by measure, pure water 1½ parts; of course the depth of the lines or relief depend upon the time of the action of the acid. For oxidizing, silver sulphuret of potassium is used in the proportion of 3 to 4 ounces to the gallon of water; the solution is used nearly boiling. The silvered articles are cleansed with soda or potash and then immersed in the sulphuret solution until a dark steel color is produced; this will take about a minute; then remove, wash well, dry out and scratch brush dry. To show the silver relieve with pumice stone and water using a cloth for the purpose.—C. H. P.

FINISHING

Q.—How can we produce the Military Bronze Finish on brass?

A.—The method pursued is as follows: The surface coating and oxide of copper was first removed, then the article was slightly coppered in the regular manner. A dilute solution of liver of sulphur was then prepared, using ¼ ounce of the liver of sulphur to each gallon of water. The article was immersed in the solution until a dark brown oxide was produced, the article was then dried out in the usual manner and lightly scratch brushed, then lacquered with a French varnish dip lacquer consisting of one part varnish and two parts of an equal mixture of amyl acetate and fusel oil as a thinner. The articles are allowed to dry and then lightly painted over with finely powdered sanguine medium dissolved in turpentine and adding a few drops of turpentine copal varnish. A ½-inch camel's hair brush is used for this purpose, a light coating is given and the articles are then dried upon the lacquer heater; when cold and hard the articles are lightly brushed with a three-inch goat hair brush on the same principle as a machine tampico brush. The speed should not be more than 750 to 1,000 revolutions per minute, use a little beeswax if a lustre is desired, otherwise use the brush only; the pressure against the wheel must be light. Finely powdered jewelers' gold rouge can be used in the same manner. This will give a darker bronze.—C. H. P.

Q.—Please publish a formula for mellow green finish on brass. This finish looks like a gray and has a sand blasted appearance.

A.—The color you refer to is probably a pigment color.

A large manufacturing concern in the East produces a number of these finishes by the pigment method. The method is as follows:

Sand blast the surface if possible. If made of brass darken the surface by any of the usual methods; if of copper slightly oxidize the surface. Now lacquer the surface with French varnish; put in denatured alcohol thinned a little with fusel oil (1 part of varnish and ½ part fusel oil) will answer. Allow the surface to dry for ¼ of an hour; now mix dry white lead or dry zinc with turpentine; work well until good and smooth, then add just a little dry chrome green to produce a tint. If you mix up a half pint add ½ teaspoonful of hard oil finish or turpentine copal varnish; this is for a binder. Now take a Fitch varnish brush about ¾ to 1 inch in size; paint the surface as even as possible and then allow to dry on a heater; in ten minutes the surface will be dry; it should then have an opaque appearance. When cool rub with canton flannel, using a little beeswax on the cloth; or a slow running canton flannel buff may be used; this will develop a smooth green color on the high light, while the backgrounds will show the gray tint; of course the green can be varied according to the amount of dry color added to the whites.—C. H. P.

Q.—We should like to know how to produce a patina green tone on one side of an article, the other side being silver.

A.—To produce patina green or verde bronze tone upon an article one side of which is to be silver and the other patina or verde bronze, proceed as follows:

Copper plate the article, then lightly oxidize the surface with a coat of air drying japan thinned with gasoline; allow to dry well, and then silver plate the other side when the silver operation is completed, remove the air drying japan with gasoline, dry out and cleanse lightly with potash. Now prepare a solution consisting of:

Sulphate of copper	1 oz.
Sal ammoniac	2 ozs.
Warm water	1 qt.

Then moisten maple sawdust with this solution and cover the copper and oxidized surface with the sawdust, allow to remain for several hours, or until the green formation is produced. The sawdust is then removed and the article passed rapidly through cold water and allowed to dry without heat. The surface should be lacquered with a transparent lacquer by spraying with an atomizer, allowed to dry and then the silver surface finished, cleansed with the aid of benzine, dried, and if lacquering is necessary, dip lacquer. When dry the green surface should be brushed up with a soft brush using a little beeswax drawn over the brush, or a paste may be made by dissolving beeswax in warm turpentine.—C. H. P.

PLATING

Q.—I have some nickel plating solutions which have been in use for eleven years. The solution is slightly acid and stands 6 degs. B., but the deposit is very hard. How long should a nickel solution last? My voltage is 10 from a 75-ampere shunt wound dynamo. What would you advise?

A.—Your voltage is extremely high for nickel plating. 3 to 4 volts give better results; it would be as well to reduce

the voltage by placing a rheostat in the field circuit. Solutions will give results indefinitely if proper care is taken of them; we know of nickel solutions in use for twenty years that are giving good results today. The high voltage would have a tendency to produce a hard nickel. A nickel solution very slightly acid to test paper should give excellent results if the nickel and ammonia salts are in the correct proportions. Sulphate of nickel can be constantly added to replenish the bath as long as the conductivity is correct, that is, the nickel is white and does not show dark lines from the stinging wires; then sal ammoniac or salt of sulphate of ammonia should be added, 1 to 2 ounces to the gallon. We would advise you to add 1 or 2 ounces of sal ammoniac to each gallon of solution; this will produce a softer deposit. If the solution then shows over 6½ degs. B. reduce it with water to 5½ or 6 degs.—C. H. P.

Q.—What formula for nitrate silver solution is practical for heavy plate? I want acid silver instead of alkali.

A.—No satisfactory results have ever been produced with acid silver solutions. According to many authorities the silver bath, consisting of cyanide of silver in solution of potassium cyanide, produces the most satisfactory silver deposit. Many operators use the silver chloride; others dissolve the nitrate of silver first in water and then directly in the solution of cyanide of potassium. Baths made up of either silver cyanide or silver chloride, are the only ones that have stood the test of time.—C. H. P.

Q.—I would like a recipe for plating steel knives nickel so that they will not peel off. Can it be done?

A.—The knives are polished in the regular way and then dipped in machine oil; from this bath they go to a caustic potash solution of double the usual strength, then clean in an electric cleaner and rinse in cold water, after which they are passed through a second potash solution of the regular strength.

The knives are then ready to be plated and a good adhesive coat should be obtained.—C. H. P.

Q.—We have three 75-gallon tanks to run for nickel, copper and brass solution and two 25-gallon tanks for silver and striking solutions. What size dynamo should we use and how many rheostats, volts and ammeters should we have?

A.—A dynamo of 4 volts, 300 amperes will be large enough for your purpose and would probably serve for some time to come. A dynamo of this size is capable of handling from 600 to 800 gallons of solution. It is necessary to have a rheostat for each tank to control the current and prevent the burning of the articles, owing to the variation of surfaces. One voltmeter can be arranged for the series of tanks and one amperemeter can be so placed that the amperage can be shown at each individual tank or the total used with all the tanks. Some platers use only a voltmeter and regulate the current with the rheostat alone. If you are of a mechanical turn of mind you can easily arrange rheostat at very little cost from various sizes of copper and iron wire.—C. H. P.

INSULATING

Q.—Can you recommend an impregnating material that can be used as to prevent wood from soaking up liquids, or, in other words, make it a non-conductor?

A.—Paint the dry surface of the wood with two or three coats of soluble water glass (commercial sodium silicate); this should be applied quite hot, so it will penetrate the pores of the wood. When quite dry, coat again with a solution of about 1 part sodium bicarbonate in 8 parts of water. In this coating silicic acid is separated by the carbonic acid of the bicarbonate from the water glass, absorbed by the pores of the wood, which, as it were silicifies the wooden surfaces, rendering them resistant to the penetration of liquids and increasing their durability.

C. H. P.

TUMBLING

Q.—Please suggest the best method for tumbling steel wire rings trimmed with silver and bronzed. I wish to save buffing.

A.—First tumble your articles in water, to which is added 2 ounces of carbonate of soda to each gallon, then dry out and tumble in macerated leather meal, adding a little dry Vienna lime to assist in the polishing. This method should give you a good surface. For a rinse after nickel plating, use a warm solution consisting of:

Platers' compound	1 oz.
Water	1 gal.

Wash the articles first in cold water, then immerse in the compound (this should be maintained nearly boiling), dry out directly from this with the aid of maple sawdust.—C. H. P.

WELDING

Q.—I have a steel shaft 4 in. in diameter and 5 ft. long. I want to run ⅞ in. of copper on the shaft, but I am troubled with shrinkage.

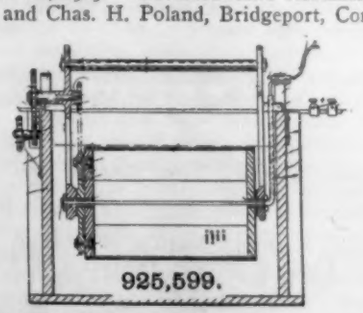
A.—If you will heat your shaft quite hot and pour as soon as mold is closed and before any dampness can condense on shaft, the copper and shaft will shrink together. Increasing the thickness of the copper will heat up the shaft also, and the copper will be less likely to crack. A good grade of copper should be used, and it should be thoroughly poled and not poured too hot.

J. L. J.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

925,599. June 22, 1909. ELECTROPLATING APPARATUS. John B. Russ Shelton and Chas. H. Poland, Bridgeport, Conn., assignors

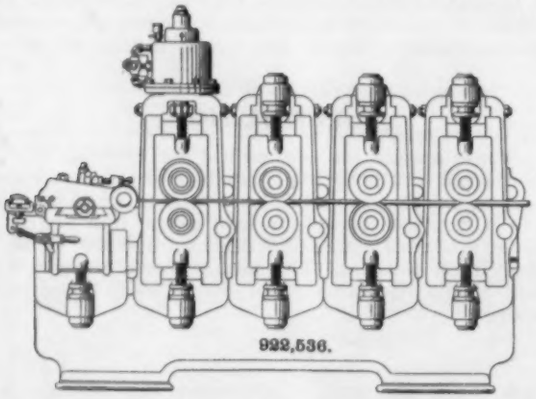


to Robert N. Basset Company, Shelton, Conn. An improved form of electroplating apparatus where the work to be plated is confined in a perforated tumbling drum immersed or partly so, in an electrolytic solution. The principal feature of this machine shown in cut is that it has the return current leading from the cathode, carried by an independent part insulated from the solution. By this means short circuiting is eliminated to a considerable degree, and also avoids the tendency of the electrolytic bath to deposit a coating in those parts of the structure made of conducting material.

912,964. June 1, 1909. PROCESS OF MAKING GRAPHITE. E. G. Acheson, Niagara Falls, New York, assignor to International Acheson Graphite Company, Niagara Falls, New York. By previous processes of this inventor graphite has been made in electric furnaces by subjecting to the intense heat of such furnaces, carbon admixed either naturally or artificially with materials capable of forming carbides. He has now discovered that it is possible to produce graphite from carbon either devoid of

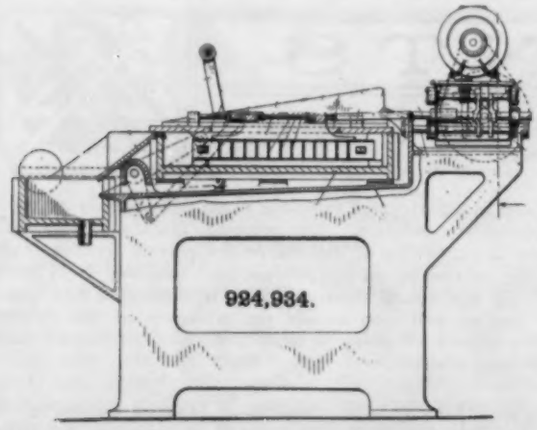
such carbide producing material or containing it. He has perfected a very complete transformation of amorphous carbon by causing metallic vapors to act upon the carbon at the high temperature of the electric furnace. This is done by subjecting metals or metallic compounds to heat in the electric furnace containing the amorphous carbon, thus volatizing the metal or compound and causing the vapor to permeate the mass of carbon which forms the charge of the furnace.

922,536. May 25, 1909. TUBE FORMING MACHINE. Lester C. Smith, Rome, N. Y., assignor to Coe Brass Manufacturing Company, Torrington, Conn. This is a tube-forming machine in which a completely closed tube is formed in four passes through rolls. What is covered by this patent is the combination with set of drawing and forming rolls of a tension and guiding device, the latter consisting of a fixed table, a clamping plate and adjustable side plates operating in connection with the fixed table, and edged trimming cutters provided at the delivery end of the



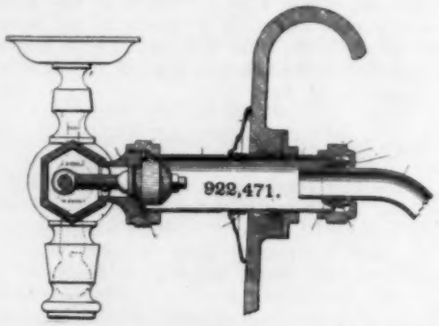
fixed table. As shown in cut there are four pair of rolls, the first pair are formed and adapted to operate to trim in the edges of the strip to the curvature of the finished tube, the second pair give a relatively sharp transverse bend to the middle of the strip and bring it to a curvature less than that of the completed tube. The third pair close the tube to an oval form with the meeting edges in the larger end of the oval, and the fourth pair give the final circular form and expand or open the sharp bend formed by the second pair of rolls.

924,934. June 15, 1909. ETCHING APPARATUS. Charles Reverdys, New York, assignor to F. Wesel Manufacturing Company, Brooklyn, N. Y. It has been found heretofore in apparatuses of this kind, used for the etching of metals by acids; that when it becomes necessary to agitate the bath, no really successful method has been in use. Some machines exist that employ vanes or ribs



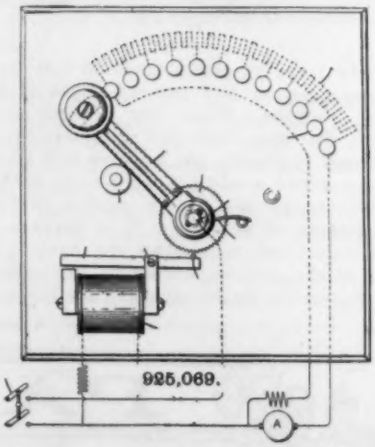
formed of thin plates which project downwardly in the bath and are reciprocated back and forth directly over the plate or plates that are being etched. It has been found, however, that at the points where each rib or vane stops in the reciprocation of the agitator; there is produced upon the underlying plate a corresponding portion which is improperly etched and which serves to destroy the uniformity of etching over the entire plate. To overcome this difficulty the present invention as shown in cut provides for a movement of the agitator in addition to its former reciprocatory one, so that upon successive strokes of the agitator the ribs or vanes stop in different position over the plate, and hence the etching is uniform.

922,471. May 25, 1909. SUPPLY PIPE CONNECTION FOR BATH-COCKS. Joseph H. Glauber, Cleveland, Ohio. Heretofore all coupling or connecting tubes corresponding to the shank connection as shown in cut have been made of cast metal. By reason of many defects due to the casting process, and which are rarely



detected until the article is finished and tested, there is considerable loss in time, labor and material. This invention overcomes this objection by making such shank members of a drawn metal tube which has obviously many superior advantages.

925,069. June 15, 1909. RHEOSTAT. Paul H. Zimmer, Schenectady, assignor to General Electric Company, New York. This is a motor rheostat designed to regulate the speed of a motor in a reliable, safe and efficient manner. The rheostat as shown in cut is provided with a no-voltage magnet whereby in



failure of voltage the controlling element will always be brought back to a protective position. The claims of this inventor include a rheostat comprising a series of contacts, a controlling arm therefor having a bias to an initial position, a member mounted independently of the arm and having a yielding engagement sufficient to overcome the bias.

922,552. June 1, 1909. TUBE-MACHINE. Anton Mill, Cincinnati, Ohio, assignor to Peters Cartridge Company, Cincinnati, Ohio.

922,553. June 1, 1909. TUBE ROLLING MACHINE, same as 922,552.

922,585. May 25, 1909. METHOD OF MANUFACTURING CARTRIDGE-SHELLS. Leslie E. Hooker, Pawtucket, R. I.

926,024. June 22, 1909. QUICK-CLOSING FAUCET. Henry F. Shroeder, Cleveland, Ohio, assignor to Globe Brass Manufacturing Company, Cleveland, Ohio.

Associations and Societies

REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

NATIONAL ELECTROPLATERS' ASSOCIATION OF THE UNITED STATES AND CANADA.

President, Chas. H. Proctor, Arlington, N. J.; Treasurer, Nathan E. Emery, New York, N. Y.; Secretary, Benj. W. Gilchrist, Woodhaven, N. Y. All correspondence should be addressed to the Secretary, Benj. W. Gilchrist, Box 26, Woodhaven, N. Y. The objects of the association are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets the first Friday of each month, 8 p. m., at the Hotel Chelsea, 222 West Twenty-third street, New York City.

The fourth regular meeting was held Friday, June 25, 1909, at Hotel Chelsea, 222 West 23d street, New York. There were 25 members present and a very interesting session was had. The following new members were elected: Roy Stoat, Newark, New Jersey; Samuel Goldhamer, Cleveland, Ohio, and Henry J. Per Doest, Buffalo, New York, as active; E. Lamoureux, Chicago, Illinois, and Henry S. Wyckoff, East Orange, New Jersey, as associate members. Several more applications are in the hands of the advisory board.

It was voted that seven members should constitute a quorum, thus completing Article 4, Section 3 of the Constitution. Percy S. Brown read a paper on the subject of excess of arsenic in a brass bath; this paper is published in another column of this issue of THE METAL INDUSTRY. Royal F. Clark also read a paper in which he embodied his experiences with arsenic in a brass bath as given in his paper on "Klondyke Gold Finish," published in THE METAL INDUSTRY May, 1908. Following these papers a discussion was held on the subject and some very interesting methods were evolved by the members present.

The subject for the next meeting was announced to be "SPOTTING OUT OF PLATED ARTICLES." This meeting will be held July 16th, 1909, at Hotel Chelsea and will be a meeting for discussion. The August meeting will probably be held at the seashore, a committee having been appointed for that purpose; it will probably be August 7th.

The printing committee had prepared a pamphlet setting forth the objects and advantages of the association. This pamphlet was ordered to be printed and placed in the hands of the secretary for distribution. We publish it in full.

OBJECTS OF THE NATIONAL ELECTROPLATERS' ASSOCIATION OF UNITED STATES AND CANADA.

I shall pass through this world but once. Any good thing, therefore, that I can do, or any kindness that I can show to any human being, let me do it now. Let me neither defer nor neglect it, for I shall not pass this way again.—*Amiel.*

The art of electro-deposition and the coloring of metals has long since taken its place in the front ranks of the metal manufacturing world. The craftsmen or platers have labored incessantly to bring the trade to its present high standard. In most cases they have worked as in the dark, and the "rule of thumb," with what inherent ability they possessed, was dependent upon for results. This, along with the "secrets" of the trade, has given way to the higher and more definite plane of co-operation and investigation. It was through this development that the National Association of Electroplaters of the United States and Canada was organized in New York City in April, 1909.

The need of such an association was long ago felt, but no definite steps were taken until early in 1909, when a few platers—men who have made a name for themselves in the development of the trade, and who have been untiring in their efforts to break down the feeling among platers that "secrets" must be jealously guarded—met in New York City and discussed the means of bringing platers more closely together. The result was more than was anticipated and from all over the country came letters of inquiry and encouragement. The association was organized, and in the first article of the Constitution the keynote of its object was sounded:

ARTICLE I. SECTION 2.

The object of the association shall be the advancing and dissemination of knowledge concerning the art of electro-deposition of metals in all its branches, including the finishing of metals generally, and to maintain an employment bureau for the benefit of members and the trade at large. A bureau of information and a laboratory for research work will be maintained by the Association and meetings will be held for the purpose of presenting papers upon appropriate subjects as well as the publication of such literature as may be deemed advisable.

The membership is divided into three classes, viz.: active, associate and honorary.

It is also the object of the association to encourage the formation of branch associations all over the United States and Canada, so as to bring all platers into a closer fellowship. At the meetings of all the associations subjects relating to plating in all its branches will be discussed for the mutual benefit of all, and so that all will leave the narrowness of to-day behind and develop into the broadness and liberty of to-morrow. If there is a division of opinion on any subject, the parent association will have that subject brought before all the other associations, and publish the result. The individual plater will not have to depend upon his own meagre knowledge, but will gain the experience of others who are willing to help and be helped.

In this way the art of electro-deposition will keep pace with the modern sciences, and work will be carried on under scientific principles. This is an age of progress, and the slogan of the day is "investigation." Not to know the solutions with which you work is to acknowledge that you are not keeping up with the times. Secrecy and taciturnity, with which the old-time plater hedged himself about, has been broken down, and the chemist and metallurgist have laid bare the most cherished formula, and given the result of their investigations to the world. It is no longer the formula that counts, but the man behind the tanks fortified with the broadness of the truth of "Knowledge is Power."

To this end it is the object of the association to establish a chemical and metallurgical laboratory which shall be in charge of an expert practical plater who will make investigations and conduct a research department for the benefit of the members.

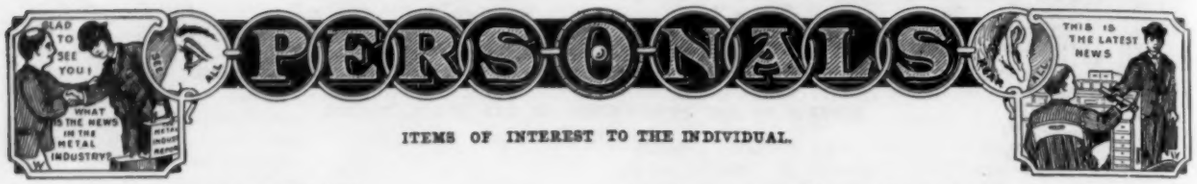
This, along with the compilation of all known and tried formulæ, the result of the discussions of all the associations, and a library of all books and periodicals published in the interest of electro-plating, will give a most complete and invaluable bureau of information.

All applications for membership are subjected to a rigid investigation by the executive board before being presented to the association. This insures a membership of the highest class, and hence manufacturers in need of first-class platers can avail themselves of the services of the employment bureau which will be conducted free of charge to both employers and employee.

At the convention, which will be held each year, papers upon the most important phases of electro-plating will be presented by capable men, also papers upon the perplexing questions of the trade will be read for open discussion. An exhibition in conjunction with the convention will be held for the manufacturers of platers' supplies to exhibit their goods and to illustrate the advancement of the trade in general.

Application blanks for membership may be had by addressing the secretary, B. W. Gilchrist, Box 26, Woodhaven, N. Y.

The Birmingham (England) Metallurgical Society has just concluded a most successful session. The papers read have been exceptionally interesting, and have covered a wide range of subjects of practical interest to users of metals.



ITEMS OF INTEREST TO THE INDIVIDUAL.

THOMAS EVANS.

THOMAS EVANS.

We present herewith portrait and short sketch of Mr. Thomas Evans, of Germantown, Pa., one of the officers of the American Brass Founders' Association, which was unavoidably omitted from the list published in the June number of THE METAL INDUSTRY. Mr. Evans is the vice-president for the territory covered by Pennsylvania, Maryland, Delaware and District of Columbia. That Mr. Evans is an earnest and energetic business man is evidenced by the position he holds in the industrial world. He is secretary and treasurer of the Einon, Evans Manufacturing Co., of Philadelphia, manufacturers of steam specialties such as blowers, condensers, syphons, injectors and exhausters, also bronze castings up to 10,000 pounds, which company he helped to organize in 1892.

Mr. Evans was also one of the founders of the Manufacturers' Association of Philadelphia and occupies the position of treasurer of the association as well as being a member of its executive board. He is a man of varied business experience, having gone from college into banking, where several years' experience in this line fitted him for the positions the duties of which he now performs so satisfactorily.

U. T. Hungerford, president of the U. T. Hungerford Brass & Copper Company, and of the American Manganese Bronze Company, sailed for Europe Saturday, July 3rd, to be gone several months.

A press dispatch states that Walter D. Allen on July 8th became general manager of the Yale and Towne Manufacturing Company, of Stamford, Conn. Mr. Allen had been general superintendent for several years. In 1891 when 14 years of age he entered the company's employ at the bottom rung of the ladder and has advanced step by step to the position of general manager.

M. P. Fillingham, a well-known mechanical engineer who has long been identified with the brass and copper rolling mill trade, having formerly been connected with the largest makers of brass rolling mill machinery, and also with the American Brass Company, is now consulting engineer for the Mesta Machine Company, of Pittsburg, Pa., and manager of their New York office, which is located at the Hudson Terminals, 50 Church street.

George W. Fleming, secretary and treasurer of the G. W. Fleming Company, Bradford, Pa., has sold his patents on plumbers' brass goods to the Pittsburg Gage and Supply Company, of Pittsburg, Pa. Mr. Fleming will be connected with the Pittsburg company in a selling capacity.

Geo. L. Rice, formerly foreman plater and more recently superintendent of the enameling department of the Woodhaven, L. I., factory of Lalance & Grosjean, manufacturers of steel enameled ware, has taken a similar position with The Carnegie Steel Company, Pittsburg, Pa. It is reported that this company is going into the enameled steelware business.

J. F. Meinke has accepted a position as foreman plater with the firm of Edward Miller & Co., Meriden, Conn. Mr. Meinke was formerly employed in the same capacity by the New Jersey Lamp and Bronze Company, New Brunswick, N. J.

Thomas F. Jordan has accepted a position as foreman plater of the New Jersey Lamp and Bronze Company, New Brunswick, N. J. Mr. Jordan was employed for a number of years by Edward Miller & Co., Meriden, Conn., as foreman plater.

Charles M. Hall, vice-president and general manager of the Aluminum Company of America, has been taken suddenly ill while on a business trip to England. Mr. Hall is now confined to his hotel in Southampton, and Dr. W. H. Hodge, his physician, left July 10th on the Caronia, of the Cunard line, to attend him.

DEATHS

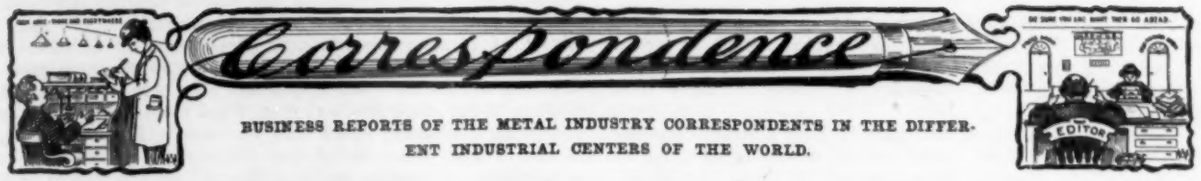
On July 8 George W. Jacques died suddenly in the board room of the New York Metal Exchange. Mr. Jacques had been a member of the Exchange for twenty years and was well known and respected by the entire metal trade. Mr. Jacques was in his 63rd year and leaves a widow, two sons and a daughter.

John F. Callahan, foreman plater for Factory "L" of The International Silver Company, Wallingford, Conn., died at his home in that city on April 22. Mr. Callahan was 51 years old, and a plater of wide experience and reputation. He learned his trade in Wallingford, where he was born. After a number of years' absence from the city, during which time he occupied various positions in different parts of the country, he returned to his native town and filled the position he held at the time of his death.

PYROPHORIC ALLOYS.

The Zeitschrift für Electrochemie (vol. 14, page 549) has published an address on pyrophoric alloys which was presented before the Bunsen Society at Vienna by Mr. B. Weiss. Auer von Welsbach discovered that an alloy consisting of 70 per cent. of cerium with 30 per cent. of iron has the remarkable property of throwing off an extraordinary amount of sparks when rubbed with a knife blade or file. It has been found that the cerium metals (cerium, lanthanum, neodymium, and praseodymium) alloy with iron in all proportions and that all these alloys, if not containing over 75 per cent. of iron, give off sparks, when scratched with an iron wire. Alloys with about 30 per cent. of iron show this effect in the most marked degree. The sparks from the alloys containing lanthanum give off more light than those from other alloys, while the sparks from the cerium alloys are hotter and are better able to ignite inflammable substances. Nickel, cobalt or manganese can be substituted for iron, but the effect is much diminished. The pyrophoric alloys are hard and melt at about the same temperature as cast iron. They are easily formed by adding the desired amount of finely divided iron to the molten cerium. They show promise of many technical uses, such as for igniting gas jets, miner's lamps, etc., and possibly for sparking gasoline engines.

Dr. Loocke (Zeitschrift öffentliche Chemie, 14, page 226) mentions several cases where the beautiful patina on old bronze statues has been altered during the last few decades. He attributes this change to the increased burning of coal and to the establishment of industries which send corrosive gases into the air.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

JULY 7, 1909.

Looking over the half year just closed, Waterbury's metal manufacturers are well pleased, and although the usual slump of this period of the year is now being felt, it is not depressing, and the general feeling of confidence has not abated one whit. There is a bright outlook, along conservative lines, and the fall business is expected to swing into the stride of 1906 or strike an even better gait, unless unforeseen storms develop in financial circles.

Extension of factories will continue and there will be considerable shifting hereabouts in transferring departments to new buildings. Already the Blake & Johnson Company has opened its new plant in Waterville, and within a year or two extensive additions to the factory settlement in that section are expected.

There has been considerable experimenting in this vicinity in recent years in brass plating and in some of the factories now the work has reached a stage which is considered far beyond experimental and full of profitable possibilities. Other concerns, on the other hand, still regard the work so hazardous that they will give no guarantee of quality brass plating, on the ground, they maintain, that brass plating will not prove satisfactory to the consumer, and if perfected to the highest known degree will cost but a negligible amount less than solid brass.

One of the largest brass plants here does not undertake brass plating to any extent because, as one of its officers put it, in a recent interview, "we have found that the goods cannot be manufactured with any degree of satisfaction on account of iron being porous. Within a short time there will be rust on the surface of a piece of brass plated iron, so that the goods are not fit to store. Druggists, for instance, or dealers in toilet articles which might be plated with brass, prefer to buy their stock in large quantities, and in a storeroom these goods would be apt to tarnish or spot so quickly as to be unsalable in a few months' time. That, at least, has been our experience, and we do not take orders for this class of goods with enthusiasm."

Another large factory claims that it is doing an extensive business in brass plating, and has few complaints. During the past three years this line of work has developed rapidly, and the company's men seem to have found a finish which will stand time and resist chemical change with fair satisfaction.

In one of the largest brass plants in the country, not a part of the American Brass Company, by the way, is a finely equipped brass plating room on which considerable money has been expended to overcome the difficulties of the work and to find machinery which will perfect the product and minimize the labor. "I am free to admit," said a representative of this concern, "that we have had trouble, chiefly with goods which spot. We think we have finally overcome this, and only occasionally now do we strike a bad lot." This company has its own way of treating the goods to be plated to obviate the difficulties of rust and spotting, and is now turning out stove ornaments of iron or steel, brass plated. Tests chiefly by means of exposure to various atmospheric changes have shown satisfactory results and the company is encouraged to increase the capacity of its plating department considerably in the next few months.

For lacquering the tops of cans used for toilet powders, millions of which are turned out here now, this company has found a spraying method, devised in its own shop, very successful. As a result of several tests made on samples, one of the big powder manufacturing companies recently placed an order for 600,000 brass plated steel tops for powder cans.

Only the cheaper grade of goods are plated in most of the factories. Lamp burners, small cans, trimmings of various kinds for gas and electric light fixtures, etc., have been brass plated, but without any guarantee against the ravages of time, and on that account the solid brass work is done with more satisfaction. One of the minor details which make against the advance of brass plating is the cheapness of waste, which seldom brings more than $4 a ton.—F. B. F.

PROVIDENCE, R. I.

JULY 7, 1909.

The jewelry trade in this city is now at a standstill, practically all of the shops being closed for the summer vacation. Some close for a week, others for 10 days and still others for two weeks. Every report from the trade continues to indicate that a strong tide of business will set in as soon as the new season opens. A tone of confidence characterizes the whole situation.

The closing down for a vacation was recommended by the executive board of the New England Manufacturing Jewelers' and Silversmiths' Association. The period of idleness will be utilized by the factories in cleaning up machinery, taking inventory and getting ready for the fall rush. It is expected that the new season's business will be at its height by the middle of August.

The Gorham Manufacturing Company is so rushed with orders at the present time that it has been unable to close down during the first two weeks of the month, and will give the employees a vacation the last two weeks of July instead. Every department in the factory is being pushed hard, so good is the condition of business at the present time. The bronze department is working day and night, and there is some question as to whether this department can suspend for a vacation.

The manufacturing jewelers of this city and Attleboro dropped all their cares on Friday, June 18, and spent a day in an outing on Narragansett Bay. The preparations had been under way for many weeks, with the result that everything had been arranged down to the smallest detail. Five hundred and fifty members and guests laid aside business and, obedient to the admonition that has ruled at the outing of the past quarter-century, "if any man talks business, swat him," went to work to have a good time.

At 10:30 o'clock the jewelers formed line at Masonic Temple and paraded through the streets of the city, with Chief Marshal Frank B. Reynolds in the van. Each parader was furnished with a Japanese parasol. A few minutes after 11 o'clock the party set sail on the steamer *Warwick* for Field's Point, where a special shore dinner was served. After being photographed the party re-embarked and sailed to Newport, where a visit was made to the United States Naval Training Station. At 5 o'clock the steamer started back for home, luncheon being served on board.

The arrangements for the outing were in charge of the executive committee of the New England Manufacturing Jewelers' and Silversmiths' Association, consisting of Everett L. Spencer, chairman, Harry M. Mays and Frank B. Reynolds.

Louis Kranz, one of the oldest German residents and most expert jewelry designer in this city, died at his home in Norwood two weeks ago at the age of 74 years. He was prominently identified with the Y. M. C. A. work of the city. Arriving in this country when a young man he attended the art school of the Cooper Institute, where he studied under Blassman, the sculptor. Developing marked ability in engraving, he was employed as foreman of the gold jewelry house of Kuhn & Doerflinger, and then went into business for himself. His two sons, Walter P. and Howard L., were associated with him.

Herbert G. McKinney, formerly prominent in jewelry circles in this city and State as the head of the firm of McKinney and Smith, which was in business at 54 Page street, died in New York recently. He was born in England, but came here when a young man and went into the jewelry business. He retired from active business life some years ago. He was widely known among the jewelry trade in New England and New York.

Frederick W. Reisman and Gustav Theodor Kollen, doing business as a firm under the title of the Providence Architectural

Metal Works, and Gustaf Theodor Kollen, as an individual, have been adjudged voluntary bankrupts by the United States District Court. The concern did business at 237 Dyer street. The assets are $1,559, the principal item of which is one of $1,195 for stocks, negotiable bonds, etc. There are 22 secured creditors.

The bronze department of the Gorham Mfg. Company has recently completed the construction of two new statues. One is a statue of Washington, to be placed in the Capitol at Washington, and the other symbolizes "Peace" and will be erected by the State of Rhode Island at Newbern, N. C., in memory of the Rhode Island soldiers who fought there. The Washington statue is an exact reproduction of the original marble statue by Houdon, which stands in the rotunda of the Capitol at Richmond, Va. The bronze replica will be sent by Virginia as a present to the National government, where it will be a companion piece to a statue of General Lee, which two statues represent Virginia in the hall of statuary. The "Peace" monument was designed by William W. Mannatt, of this city. It also is of bronze and will be dedicated in October.

William H. Blood, treasurer of Flint, Blood & Company, manufacturing jewelers, who was stricken with blindness while on the annual outing of the jewelers, is now able to see a little. His physicians are hopeful that he will gradually recover his full sight. It will be many months, however, before he will be able to use his eyes to any extent. The trouble was caused by the formation of a blood clot on the optic nerve.

Councilman Fred W. Morse, treasurer of the Fred W. Morse Company, tinsmiths, was warmly greeted by his colleagues on the City Council recently when he appeared for the first time after a long and serious illness. For a time it was feared that he would not recover, but he is now practically well again.

E. S. U.

BUFFALO, N. Y.

JULY 7, 1909.

There were no important developments in the metal trades last month, but a marked improvement is shown, and the outlook is for a continuance of the present healthy tone throughout the summer months.

Brass founders and jobbers are enjoying better business than in the corresponding period a year ago. The big automobile manufacturers are receiving more orders for cars, and the plating industry is helped out by this boom. Metal shops continue to receive small orders from all parts of the country.

The strike of plumbers which affected the wholesale supply dealers here was settled last month, and 200 men returned to work. Since then there has been a better call for raw materials.

Manufacturing jewelers find a good demand for rings, and their salesmen find the prospects bright for a big fall trade. Band rings have been sold to the trade in large quantities, but the demand for other manufactured jewelry was light.

Bold thieves backed a wagon up to a freight car in the yard of the Buffalo Copper and Brass Rolling Mill last week and carried out over 2,000 pounds of copper ingots, valued at $300. They buried it in a field nearby, but failed to cover their tracks, and when the man from whom they stole the horse and wagon reported it to the police a search resulted in the discovery of the copper.

A real estate transaction here last week included the purchase of the site of the Temple of Music at the Pan-American grounds where McKinley was shot, and there is talk of erecting a bronze bust of the martyred President on the spot.—F. M. A.

CLEVELAND, OHIO

JULY 7, 1909.

Conditions in most of the lines connected with the metal industry in this city are prosperous and show very plainly the effect of the return of good times. The automobile trade, particularly, is booming and this has come to be recognized in Cleveland as the most important industry affecting the metal line. Cleveland has nine automobile factories and is the second largest producer of automobiles in America. The demand for machines this year is extraordinary and most of the plants are being rushed to capacity to meet hurry up orders.

The plating business as a result is in fine shape. All the shops run directly in connection with factories are busy and many of the independent ones are finding considerable business in the automobile direction also. The manufacture of vapor and oil stoves is assuming immense proportions in Cleveland and considerable business for platers has developed therefrom.

At the recent Industrial Exposition held here one of the finest displays in the metal line was that of the Auto Plating and Manufacturing Company, which had on view a fine assortment of candlabra and other useful and ornamental novelties, as well as specimens of plating and polishing. The company is making a specialty of its black nickel plating and claims to be the only concern in Cleveland doing this line of work. They also report a good business in the plating of automobile parts.

Two fine displays were made by manufacturing jewelers at the exposition. The Webb C. Ball Watch Company showed a great variety of its finely constructed railroad watches. This company is official timekeeper for four large railroads. It is making preparations to move to new quarters on Euclid avenue near East 12th street, where a four-story factory is being erected. Another attractive display was made by the Scribner & Loehr Company, several large plate glass cases being filled with a great assortment of lodge jewels and similar plated ware, as well as some of the finer lines of jewelry. This company has an extensive factory on East 9th street near Euclid avenue and reports an active business in its various lines. The White Musical Instrument Company had a fine display of brass goods, showing the development of various brass horns from the initial manufacturing operations upward. Some fine plated goods were also shown.

Brass and copper in its beaten and turned forms has taken a great hold on the local public and the dealers are carrying a heavier line than ever before. They say brass and other metal ornaments are having the strong call, despite their expensiveness over the commoner kinds of goods. Out at the technical high school classes are being taught the hammering and working of sheet brass and copper, and a love for this kind of work and material is being instilled which will some day make its artistic effect felt in the industry.

The Cleveland Foundry Company will erect a large addition to its present plant, George B. McMillan having been given the contract for a five-story and basement building, 60 by 200 feet in size. Plans were prepared by the Osborn Engineering Company. The concern reports a very active business.

The White Automobile Company, largest maker of steam automobiles in the world, announced during the past month that it will make a departure from its present policy and will begin the manufacture of a new gasoline car. This is expected to benefit the brass, plating and metal business generally, as some changes will have to be made in the use of materials.

The W. H. Tyler Company, largest makers of ornamental metal goods in the Middle States, has been given the contract for the stairs and elevator grills for the new court house. These will be of iron finished in a brass plate, with the high lights polished. A set of giant gates to be used at the entrance to the county treasurer's office were on display at the exposition and created very favorable comment. The company had a very extensive display of brass and copper wire screens, some with meshes so minute that it could scarcely been seen through. Sections of stairways and grills used in a number of monumental buildings in different parts of the country were also on view.

Architect Arnold Brunner, of New York, has completed his plans for the elaborate bronze work to be used on the new $3,000,000 Federal building in this city. Great bronze fences and figures will ornament the outside of the building, while the interior will be replete with the finest that money can buy in brass and bronze.—S. Mc.

DETROIT, MICH.

JULY 7, 1909.

The brass, plating and polishing industry has continued at its high-water mark in Detroit during the past month. Every factory of this kind in the city, and even across the river in Windsor, Canada, is running to its capacity. The Canadian factories are principally branches of the Detroit concerns and cover a large field in Ontario and the Canadian Northwest. Prosperity in the brass and metal polishing industry here is largely due to the automobile business. While Detroit's ten or twelve automobile factories continue to boom there is no question regarding the prosperity and growth of the brass and polishing business.

Mr. E. J. Woodison, president of the Detroit Foundry & Supply Company, expresses great enthusiasm regarding both the polishing and the brass trade. Not in the history of his factory, he says, has the demand been so great for tripoli, crocus, and standard white coloring. This firm has recently absorbed the Detroit Polishers & Platers' Supply Company's business and is now working a large force of men to fill the orders that within the past thirty days have been pouring in. This firm keeps a full force of traveling men, who are covering about every section of the United States. Mr. Woodison says he finds business rapidly improving all through the West.

Elmer Fezzey, manager of the Acme Brass Foundry Company, which produces a great amount of the trolley wheels used in the United States and Canada, declares the outlook in the Middle West was never better than it is at the present time. He says the polishing business is keeping pace with the brass trade and gives promise of further advancement. This factory is also rushed with orders for plumbers' supplies.

C. B. Bohn, manager of the Allyne Brass Foundry, also declares that he never found the brass and polishing business better. This firm manufactures automobile and plumbers' supplies as well as various other articles in brass. They also do an extensive polishing business and have a full force of traveling men taking orders all over the United States. Mr. Bohn says he finds the prices in the West are far better than those in the East. He also says the demand for brass goods and plumbers' supplies is heavy wherever their agents travel. The factory is running full blast and has sufficient orders ahead to keep busy for many months. Some large additions to the plant are planned for the near future.

The twenty-seventh annual convention of the National Plumbers' Association was held in Detroit, beginning Monday, June 21. The members, with scores of brass manufacturers from all parts of the country, combined pleasure with business. Meetings were held in the Light Guard armory, where trade conditions were discussed. Later in the day they took boats or trolleys for the many pleasure resorts up and down the Detroit river. Several of the delegates and brass men made enthusiastic addresses regarding conditions of the trade. Every one declared the outlook was never better at this season of the year. Among those who had interesting brass displays at the Hotel Pontchartrain where the delegates made their headquarters were the following: The Nye Machine Works, Chicago, Ill.; The Wolverine Brass Works, Grand Rapids, Mich.; The Detroit Bath Tub & Brass Company; The Rickersberg Brass Company, Cleveland, Ohio; The United States Brass Manufacturing Company, Cleveland, Ohio, and The Mueller Manufacturing Company, of Decatur, Ill.—F. J. H.

BIRMINGHAM, ENGLAND

JULY 1, 1909.

A slight improvement is reported from the Birmingham jewelry industry, shown in better business and more inquiries. While the shipping trade is not satisfactory, a better demand is expected from London, and the principal provinicial cities. There is still a good deal of room for improvement, as many factories are working short time, and there is a good deal of unemployment among the operatives. A rather better state of affairs is shown by the Board of Trade returns for May, exports being, in regard to plate, plated and gilt wares, £53,409, as compared with £50,620 in May of last year, and £56,664 in the same month of 1907. The aggregate for the five completed months of the present year is £240,823, compared with £220,351 and £261,458 for the corresponding periods of the two previous years.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

The Indianapolis Aluminum and Brass Company, of Indianapolis, Ind., has changed its name to the Indianapolis Brass Company.

B. H. Lacarra, has gone into business at 7a de Guillermo Prieto No. III, Mexico, D. F., and requests that manufacturers of gas fixtures send him catalogues showing their goods.

The Lennox Furnace Company, Marshalltown, Ia., has installed a complete nickel and copper plating plant in connection with its new stove factory and is prepared to do plating for the trade and for outside customers.

The Bay State Brass Company, of Haydenville, Mass., is building a 50x41-foot addition to their foundry. The new building will contain the latest novelty in molding machinery with air compressors, and melting furnaces of a new type.

The Barlow Mfg. Company, Holyoke, Mass., makers of metal store display fixtures, announce that they are now in a position to do custom electro-plating in 20 different finishes. They are also making a specialty of repairing broken automobile lamps.

At the recent exhibition of the Municipal Art Society of New York on "City Planning and Model Homes," a group of cottages for employees was shown by the Aluminum Company of America, the dwellings being those erected at the company's Massena plant.

It is reported that Philip Lipsitz will erect a plant at Dallas, Texas, for the manufacture of white metals, such as solder, type metal, babbitt, and all other soft metals having a lead or zinc base. The new plant will have a capacity of about two tons per day.

In order to simplify details in connection with correspondence, telephoning, etc., the Quincy, Manchester, Sargent Company, Plainfield, N. J., have deemed it advisable to change their name and hereafter will operate under the corporate name of the "The Q M S Co."

The Obtura Manufacturing Company has secured 10,000 square feet of factory floor space at Paterson, N. J., and is installing a large amount of machinery and equipment for the manufacture of sanitary sealing devices. The company has been operating for some time and reports that so far they have been quite successful.

The Brass Products Company, of Southington, Conn., are now installing machinery in their new factory. James H. Pratt was recently elected president of the company; Dr. W. R. Miller, secretary and treasurer, and R. Gillette, general manager. It is expected that John Madsen, a graduate of Syracuse University, will be foreman. The company will manufacture electric fixtures.

The Progressive Metal & Refining Company, Milwaukee, Wis., will build a smelting and refining plant, 100 x 150 feet in size, on a new site which they have secured at Milwaukee. The new plant is to be located on a railroad and will be equipped with all modern improvements so that the company will be in a position to handle new and scrap metal at a low cost. The capital stock of the company has been increased from $25,000 to $50,000.

The item in the June number of THE METAL INDUSTRY, referring to the consolidation of the Whitney Electrical Instrument Company, Penacook, N. H., and the Roller-Smith Company, Bethlehem, Pa., inaccurately stated that the Whitney Electrical Instrument Company had gone into liquidation. We are informed that the company has not gone into liquidation but has simply been consolidated with the Roller-Smith Company.

The Allyne Brass Foundry Company is building an extensive addition to its Cleveland plant at E. 61st place and Carnegie avenue, consisting of a foundry 62x256 feet, one story high, and an office and pattern building 60x90 feet two stories high, with basement. These buildings are all to be strictly fire-proof, being constructed of brick, steel and concrete, and equipped with metal window sash. The general contract has been awarded to W. I. Thompson and Son.

The Canadian Seamless Wire Company, Limited, Toronto, Ontario, Canada, who have been drawing brass and copper tubing for the past three years, making a specialty of ½" and under, have recently moved from their former location at 71 Adelaide street, west to 88 Terauley street, where they have additional space and power; also increased facilities for turning out brass and copper tubing, seamless gold filled wire, rolled gold plate, tubing, anodes, etc.

The new foundry which is to be erected by the Syracuse Aluminum & Bronze Company, Syracuse, N. Y., will be a fireproof structure containing approximately 60,000 square feet of floor space. It will be equipped with everything necessary to produce aluminum, bronze and brass castings, particularly aluminum, at the lowest possible cost. The company states that no expense will be spared to make this a modern plant in every respect. C. L. Ackerson is the general manager.

The policy of sharing profits with its employees has been adopted by the American Metal Company, Limited, of New York City, which has had its articles of incorporation amended so as to permit the stockholders to distribute a portion of the company's net earnings annually among its officers and employees as compensation for services rendered. The company recently increased its capital stock from $3,000,000 to $3,500,000, and increased the number of its directors from six to seven.

An unconfirmed report has been received to the effect that the Slade Tubing Company of Pawtucket, R. I., are moving their equipment to Rome, N. Y., where they will be permanently located hereafter, and in this connection a new company has been formed under the name of the Slade Tubing Company of Rome, New York, to manufacture brass and copper tubing. Incorporators, Barton Hazelton, James A. Spargo and Fred M. Shelby, all of Rome. Capital, $50,000.

As announced some time ago in THE METAL INDUSTRY the Maxwell-Briscoe Motor Company, of Tarrytown, N. Y., will erect a very complete brass foundry. Building operations have not yet been started, owing to the fact that other work in the draughting department has delayed the completion of the plans. The company reports that the designs for the building are now well in hand and that they have a number of good men in line for the responsible positions which this new department will create.

The custom that has been prevalent for a long time among many of the large Connecticut factories of giving their employees a half holiday on Saturday during the summer months is now in operation this summer by the American Brass Company, of Waterbury, Conn., who announce that during July and August employees who work 55 hours in any week will receive the same wages they would be entitled to had they worked 60 hours. A number of the other large factories have similar arrangements in operation or under consideration.

The Mesta Machine Company, Pittsburg, Pa., one of the largest makers of rolling mill machinery in the country, are now giving special attention to the brass and copper mill trade. Their line of equipment includes rolling mills, steam and gas engines, air compressors, condensers, iron, steel and chilled rolls and machine molded and cut gears. They also make bronze castings, iron castings up to 110 tons in weight and steel castings up to 50 tons in weight, and recently installed machinery for cutting spur gears up to 22 feet, and bevel gears up to 16 feet, in diameter.

The Bridgeport Brass Company, Bridgeport, Conn., has awarded the contract for the mason work on their new power house to the Dowling & Bottomley Company. The same firm will do the mason work on the new tube mill. The power house will be a steel and brick building 62x65 feet, one story high. The tube mill will also be of brick and steel 100x360 feet, one story high. The plans for these structures were made by the company's engineering department under the supervision of Mr. Fletcher, of Fletcher & Link, who is acting as construction engineer for the Bridgeport Brass Company. The contract for the carpenter work will be let soon.

REMOVALS

The main office of The New Jersey Zinc Company has been moved from 71 Broadway to 55 Wall street, New York.

Roth Brothers, of Chicago, Ill., manufacturers of motors, etc., used in the plating and metal working plants, have moved to Adams and Loomis streets, where they have a fine new factory.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

CROWN METAL CONSTRUCTION CO.; Jamestown. To manufacture metal furniture, etc.; capital, $75,000. Incorporators: D. Lincoln, J. Wonnberg, M. R. Nelson, Jamestown.

THE MINNEAPOLIS METALIZING COMPANY, of Minneapolis, Minn.; capital, $30,000. Incorporators: L. V. Peck and F. T. Nelson, of Minneapolis, and C. F. Dahlberg, of St. Paul.

PHOENIX BRASS & METAL CO., New York; manufacturing steam, water apparatus, valves, etc.; capital, $10,000. Incorporators: Edward Gunnell, No. 210 Waverly place; Stephen McFarland, No. 44 Morton street; Patrick J. O'Brien, No. 44 Charlton street, all of New York.

GARWOOD BRONZE AND IRON WORKS, Garwood, N. J. Capital, $100,000, of which $1,000 is subscribed for. The officers are W. S. Tuttle, president; W. T. Dette, secretary and treasurer. A general foundry business in stove plates and other grey iron, bronze, brass and aluminum castings will be carried on; light machine work and enameling, nickeling, etc., will also be done. The property, equipment and business formerly known as the Enterprise Foundry Company has been acquired and this plant will be improved and enlarged as the business grows.

REORGANIZATIONS

The brass foundry business which has been conducted for the past eighteen months by I. B. Gilbert, of East Stroudsburg, Pa., has been incorporated as the Monroe Brass Works. I. B. Gilbert has been elected treasurer and manager. The company is capitalized at $50,000.

The business which has been conducted under the name of Grove Hinman, Plainfield, N. J., has been incorporated under the name Grove Hinman, Incorporated. Capital, $125,000. The company manufactures architectural, monumental and decorative art work in bronze and other metals.

FINANCIAL

The seventh annual report of the International Nickel Company, for the fiscal year ending March 31, 1909, shows that the company made a net profit for the year, after making deductions for depreciation of plants, exhaustion of minerals, bond sinking fund and interest on bonded debt, of $1,005,493.74. A. Monell,

president of the company, states that the efforts that have been made to introduce "Monel Metal," which is a natural alloy of copper and nickel, and which was described in the January, 1909, number of THE METAL INDUSTRY, are beginning to bear fruit and that it is expected that this metal will be an important factor in the company's future operations.

BUSINESS TROUBLES

The New York Brick and Paving Company, of Syracuse, N. Y., have gone into bankruptcy, and Henry M. Lockwood, attorney and counselor at law, No. 1 Larned Building, Syracuse, N. Y., has been appointed trustee. The company are manufacturers of acid proof brick for the use of chemical, metal and plating plants.

PRINTED MATTER

THE SILENT PARTNER for June, published by the Globe Machine & Stamping Company, Cleveland, O., is at hand, and as usual contains a lot of good things.

THE "JOHANSSON" COMBINATION STANDARD GAGES. Illustrations of gages and much information concerning them is given in a large 27-page catalogue recently issued by the Gronkvist Drill Chuck Company, 18 Morris street, Jersey City, N. J.

THE NAPOLEON MAGAZINE, published monthly by The City Brass Foundry Company, Cleveland, O., contains in the June number 16 pages of reading matter, mostly humorous, and advertisements of the company's principal products, such as Napoleon bronze, rolling mill bearings, and aluminum castings.

MACHINERY AND TOOLS. Brown and Sharpe Manufacturing Company, Providence, R. I., have sent us their 1909 catalogue, which is similar in size and arrangement to their previous catalogues and which gives in condensed form much information likely to be required by purchasers of their machinery and tools.

EMERY TRAY. The Hanson & Van Winkle Company, Newark, N. J., are putting out an emery tray for "setting up" polishing wheels. A circular giving the dimensions, price and other particulars will be sent to anyone who will write to the company for it. These trays are inexpensive and soon pay for themselves in the value of the emery saved.

METALS AND SOLDERS. The Progressive Metal & Refining Company, of Milwaukee, Wis,, have issued a folder calling attention to the line of metals and alloys which they handle, which includes practically all the metals which brass founders are interested in, as well as babbitt metals and solders. The company also deals in scrap metals of every description and buys foundry residues.

"THE PLATE" is a little book issued monthly by the Dow Chemical Company, of Mansfield, O. The June number contains an article on wiring for the plating room by Geo. L. Wallace, with several diagrams showing various ways in which plating room equipment may be arranged, and an article by H. J. Hawkins on ormolu finish on soft metals, besides illustrations and advertisements of some of the Dow company's products.

TINSMITHS' STEAM FITTERS' AND PLUMBERS' TOOLS. Patterson, Gootfried & Hunter, Limited, New York City, have just issued their catalogue No. 225, which contains cuts, descriptions and price lists of their complete line of tinsmiths' steam fitters' and plumbers' tools. Other catalogues recently issued by this company relate to metals, auto supplies, punches, shears, shop equipment, power transmission appliances and drilling machinery.

C. G. HUSSEY & Co., Pittsburg, Pa., are sending out their price list No. 59, giving the base price and extras on copper in sheets, plates and rolls. The company manufactures a large line of products including bolts, nails, tacks, rivets, burrs, gaskets, etc. The pamphlet contains valuable information regarding these goods, and a number of useful tables giving the weights, gauge and other particulars relating to the above-mentioned materials.

POLISHING AND GRINDING MACHINERY. Webster & Perks Tool Company, Springfield, O., issues a 16-page catalogue showing their line of polishing and buffing lathes and bench floor grinders. Complete specifications of each machine are given, together with a short description of some of their special features. This company also makes sand molding machines (stripper plate style), thread cutting and tapping machinery, bolt pointing machines and machinery to order.

THE W. W. OLIVER MANUFACTURING COMPANY, Buffalo, N. Y., invite those interested in hand and power rolling mills, speed lathes, polishing machines, drop presses, draw benches, drills, etc., to send for their new catalogue No. 17, which is a very attractive booklet of 110 pages, containing illustrations and descriptions of their very complete and well-known line of goods. Manufacturing jewelers and metal goods manufacturers will be particularly interested in this catalogue.

ROLLING AND WIRE MILL EQUIPMENT. The Morgan Construction Company, Worcester, Mass., have issued a small but handsome catalogue which gives in concise form an outline of the various departments of their business. Among the rolling and wire mill equipment illustrated is the Morgan continuous type heating furnaces, gas producers, reversing valves, hydraulic machinery, including draw benches, presses, straighteners and other equipment of similar nature.

CORE OVENS AND THE CORE ROOM. A 20-page pamphlet issued by The J. D. Smith Foundry Supply Company of Cleveland, O., discusses thoroughly the best practice for core making and baking, and contains some excellent illustrations of the ovens, cars and other equipment installed by this company for some of the principal brass foundries in various parts of the country. Copies of the pamphlet will be sent upon application and should be found of interest to anyone engaged in the foundry business.

ZAPONS. The Celluloid Zapon Company, New York City, are sending out an 18-page catalogue which gives much information concerning Zapon lacquers, and the particular use to which each kind is adapted. This catalogue shows a great variety of high grade, medium and inexpensive lacquers, suitable for all grades of work and for all methods of application. Any reader who is interested in the finishing of metals is invited to send direct to the company for a copy, and those who are using lacquers in their business may obtain free samples of any of the lacquers listed in the catalogue, together with full instructions as to their use.

VALUABLE GRAPHITE PRODUCTS. This is the title of a 22-page "pocket edition" catalogue which has just been issued by the Joseph Dixon Crucible Company, Jersey City, N. J. This catalogue lists the company's products such as crucibles, facings, lubricating graphite, greases, pencils, paints, etc. The Dixon company is also distributing a large wall hanger which presents an excellent view of their extensive works at Jersey City, cuts of some of their products, and a colored view of a foundry interior. At the bottom of the hanger are printed some useful rules for the use of crucibles. Any foundryman who desires to place one of these hangers where his foreman can have the benefit of these rules should write to the company for it.

ADNEWS

John J. Fannon, Brooklyn, N. Y., an expert plater of 30 years' experience, has a card in the directory of consulting experts in this issue.

The W. S. Rockwell Company, New York City, are advertising their new double combustion chamber tilting crucible furnace on another page of this issue.

The Oriental Rouge Company, 66 Pine street, Bridgeport, Conn., are advertising their special rouges for gold, sterling, silver plate and all soft metals.

The S. Obermayer Company, Cincinnati, O., are making a special offer to the readers of THE METAL INDUSTRY, particulars of which will be found on another page. Those interested in

brass foundry supplies, particularly in core compounds, should send the coupon from the S. Obermayer Company's advertisement and they will receive in return some valuable information.

Eberhard & Jimmerson, metal spinners, Providence, R. I., have taken space in THE METAL INDUSTRY in which to advertise their facilities for designing oval and round work and doing all other kinds of metal spinning. They make a specialty of loving cups in silver, bronze and copper, hollowware in all metals, and high class chandelier and lamp work.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

	July 9, 1909. Pounds.
Stock of marketable copper of all kinds on hand at all points in the United States, June 1, 1909	169,848,141
Production of marketable copper in the United States from all domestic and foreign sources during June, 1909	116,567,493
Deliveries of marketable copper for consumption and export during June, 1909	131,557,573
Stock of marketable copper of all kinds on hand at all points in the United States, July 1, 1909	154,858,061

Total Production for the Past 6 Months.

	For Domestic Consumption.	For Export.	Total.
January	51,862,624	38,499,797	90,362,421
February	43,578,118	30,968,496	74,546,614
March	48,871,964	59,191,043	108,063,007
April	47,546,010	65,110,111	112,656,121
May	61,163,325	70,542,753	131,706,078
June	60,591,116	70,966,457	131,557,573
Total	313,613,157	335,278,657	648,891,814

In connection with these figures it should be noted that since all the statistics of the Association relate to copper in the hands of producers and their agents, the metal is regarded as delivered, either for domestic consumption or for export, as soon as it leaves the refineries and warehouses. The government statements of exports, on the other hand, do not cover the copper till it is on board ship and cleared for sailing. Owing to the fact, therefore, that some of the copper taken from refineries and warehouses for export within any given month may not actually be loaded and cleared through the customs till the month following, the two sets of monthly export figures may differ to a small extent, though over a more extended period such differences should become adjusted and the respective totals should practically agree.

METAL MARKET REVIEW

NEW YORK, July 9, 1909.

COPPER.—The London price for standard warrants shows a net decline for the month of £1 10s. per ton. The heavy increase in the foreign stocks are mainly responsible for this decline.

The attempt to boost copper prices in the early part of the month was not very successful.

The figures as published by the Copper Producers' Association on the 10th of June showed a decrease in the stocks of copper of over 13 million pounds, but against this decrease the stocks of copper abroad showed an increase of nearly 25 million pounds for the month, and this would seem to indicate that the heavy exports of the last few months did not go into consumption, but the stock was transferred from America to Europe. The exports for the month of June were 33,399 tons, making total exports since January 1, 1909, 147,105 tons, against 163,871 tons during the same period in 1908.

The prices in the New York market were pushed up early in the month on the strength of the apparent improvement in the statistical position of the metal, but when the London prices began to decline on the bad showing in European stocks, prices here did not hold and the market today is about ¼ cent below that of a month ago. We quote lake copper 13.50, electrolytic, 13, with casting brands also about 13 cents.

TIN.—The London price of pig tin shows a net decline for the month of 2s. 6d. Opening at £132, prices advanced to £135 5s. and closed at £131 17s. 6d.

The deliveries into consumption during June were 3,200 tons, making an increase of 3,050 tons for the six months of 1909 over the same period in 1908. The shipments from the straits were 4,733 tons, making the total shipments for the six months of 1909 2,245 tons less than the same period in 1908. The total visible supply on June 30, 1909, shows an increase of 4,053 tons above that of a year ago.

Prices in New York have followed very closely the fluctuations of London, and prices at the close are about the same as a month ago—5 to 10 tons, 29.25 with future shipments 10 to 15 points higher.

LEAD.—The foreign lead market has declined about 5s. during the month.

In the New York market lead has eased off slightly, the Trust price has been held at 4.35. New York and the outside market after holding around 4.40 closed at 4.35 for carload lots, New York.

SPELTER.—The London price of spelter stays around £22 per ton.

The New York market has been firm all the month and prices have advanced about 20 points. Opening at 5.25 for carload lots and closing at 5.40 to 5.45.

ALUMINUM.—There is fair demand for aluminum and prices hold steady. The American makers' quotation is 24 cents for one ton lots, with small lots three to four cents higher. The imported aluminum is quoted at 22 cents for larger lots in ingots and higher for small lots.

ANTIMONY.—There has been very little change in the foreign price for antimony.

In New York market trading has been very dull, with prices below the foreign cost, Cookson's at 8⅜ cents and Hallett's at 7.80.

SILVER.—The foreign price of silver has declined ⅜d. during the month, opening at 24⅜d. and closing at 24d.

In New York prices show a net decline of ⅞c., opening at 53 cents and closing at 52⅛.

QUICKSILVER.—There has been no change in the prices of quicksilver, $44 to $44.50 for wholesale lots and $45 to $46.50 for smaller lots.

PLATINUM.—Prices unchanged, $22.50 to $23 for ordinary, $24.50 to $25.50 for hard.

SHEET METAL.—Sheet copper is unchanged at 17-cent base, with wire at 15-cent base, sheet brass 14 cents, with rods and wire at 14¼ base.

OLD METALS.—The market is very dull and the sagging copper market has had the effect of lowering the values of all copper scrap. During the first half of the month there was a fair inquiry, but toward the close consumers are holding off.

THE JUNE MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Average.
Lake	13.75	13.50	13.55
Electrolytic	13.50	13.10	13.25
Casting	13.40	13.10	13.20
TIN	29.75	29.10	29.35
LEAD	4.40	4.30	4.35
SPELTER	5.35	5.15	5.30
ANTIMONY (Hallett's)	7.75	7.75	7.75
SILVER	.53¼	.52	52.53

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.

1909. Jan. 14⅜ Feb. 13¼ Mar. 12⅞ April 13 May 13¼ June 13½.

Trade Wants on Advertising Pages 38 to 40 Following

Metal Prices, July 9, 1909.

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, car load lots	13.50
Electrolytic, car load lots	13.00
Casting, car load lots	13.10
TIN—Duty Free.	
Straits of Malacca, car load lots	29.20
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2½c. per lb.	
Pig lead, car load lots	4.35
SPELTER—Duty 1½c. per lb.	
Western, car load lots	5.45
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods, 13c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	24.00
ANTIMONY—Duty ¾c. per lb.	
Cookson's, cask lots, nominal	8.35
Hallett's, cask lots	7.75
Other cask lots	7.60
NICKEL—Duty 6c. per lb.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE METAL—Duty 20%	.80
MAGNESIUM METAL—Duty free	$1.30
BISMUTH—Duty free	1.80
CADMIUM—Duty free	1.00
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.52
PLATINUM—Duty free	22.50
QUICKSILVER—Duty 7c. per lb. Price per pound	61c. to 62c.

OLD METALS.

Dealers' Buying prices. Cents per lb.		Dealers' Selling prices. Cents per lb.
11.50 to 12.00	Heavy Cut Copper	12.50 to 12.75
11.25 to 11.50	Copper Wire	12.25 to 12.50
10.00 to 10.50	Light Copper	11.00 to 11.25
10.75 to 11.25	Heavy Mach. Comp.	12.00 to 12.50
8.00 to 8.50	Heavy Brass	9.00 to 9.25
6.00 to 6.50	Light Brass	7.00 to 7.25
7.50 to 8.00	No. 1 Yellow Brass Turnings	8.25 to 8.50
8.50 to 9.00	No. 1 Comp. Turnings	9.50 to 10.00
4.00 to 4.20	Heavy Lead	4.25 to 4.30
3.50 to 3.62½	Zinc Scrap	3.62½ to 3.87½
5.00 to 6.00	Scrap Aluminum, turnings	5.00 to 6.75
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 18.00
Silicon Copper 10% to 20%	....according to quantity	28 to 35
Silicon Copper, 30%, guaranteed	" "	— to 38

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% to 20%....according to quantity	28 to 35
Silicon Copper, 30%, guaranteed " "	38
Phosphor Copper, 5% " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed " "	28 to 30
Manganese Copper, 30% " "	30 to 35
Phosphor Tin " "	34 to 36
Brass Ingot, Yellow " "	9 to 10
Brass Ingot, Red " "	12 to 13
Bronze Ingot " "	11 to 12
Manganese Bronze " "	17 to 19
Phosphor Bronze " "	13 to 16
Casting Aluminum Alloys " "	29 to 35

PHOSPHORUS—Duty 18c. per lb.
According to quantity ..... 30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 17 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 60 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9¼ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9¼ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from. 3 cents per pound

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over ..... Base Price.
(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

	Cents per lb.
ZINC—Duty, sheet, 2c. per lb.	
Carload lots, at mill	7.00 less 8%
Casks	7.50
Open casks	8.00

Metal Prices, July 9, 1909

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect June 21, 1909, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13½	$0.15½	$0.17
Wire	.13¾	.15¾	.17¼
Rod	.13¾	.15¾	.18¼
Brazed tubing	.19⅝	—	.21½
Open seam tubing	.17⅝	—	.19½
Angles and channels, plain	.17⅝	—	.19½

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c.	per lb. net advance
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire—Extra spring and brazing wire.....	½c.	" " " "
" —Best spring and brazing wire.....	1c.	" " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14½	$0.16½	$0.18
Wire	.14¾	.16¾	.18⅛
Rod	.14¾	.16¾	.19¼
Brazed tubing	.20⅝	—	.22½
Open seam tubing	.18⅝	—	.20½
Angles and channels, plain	.18⅝	—	.20½

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c.	per lb. net advance.
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire.....	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

15c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c.	per lb. base.
100 lbs. to 300 lbs. in one order	19c.	" " "
Less than 100 lbs. in one order	20½c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 22c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size	¼	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	20	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet— Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 45 and 5%.

PRICES FOR MUNTZ METAL AND TOBIN BRONZE.

Muntz or Yellow Metal Sheathing (14" x 48")	14c.	lb. net base
" " " Rectangular sheets other than Sheathing	16c.	" " "
" " " Rod	15c.	" " "
Tobin Bronze Rod	17c.	" " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bars in the rough 22¼c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 4c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than.....	8in.	6in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.
	and including.....	12in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.	40in.
	in coils.									
No. 13 and heavier		34	34	36	36	36	36	39	39	39
" 14		34	34	36	36	36	36	39	39	39
" 15		34	34	36	36	36	36	39	39	39
" 16		34	34	36	36	36	36	39	39	39
" 17		34	34	36	36	36	36	39	39	39
" 18		34	34	36	36	36	36	39	39	42
" 19		34	34	36	36	36	36	39	40	43
" 20		34	36	36	36	36	38	41	42	44
" 21		34	38	38	38	38	40	43	44	50
" 22		34	38	38	38	40	40	43	47	51
" 23		34	38	38	38	40	40	43	49	52
" 24		34	38	40	42	42	42	45	51	54
" 25		36	39	41	43	43	43	46	53	57
" 26		36	39	42	46	46	46	51	55	61
" 27		36	40	44	48	48	49	54	58	64
" 28		36	40	46	48	49	49	56	62	67
" 29		38	41	48	50	52	52	61	67	72
" 30		38	42	50	52	56	62	69	72	77
" 31		43	47	55	58	63	71	74	77	83
" 32		45	49	57	61	69	77	91	90	95
" 33		47	51	60	65	73	84	91	100	110
" 34		50	55	62	70	78	91	103	110	120
" 35		..	65	70	80	90	100	115	125	..
" 36		..	80	90	100	115	120	135	..	..
" 37		..	104	114	129	144	159	174	..	..
" 38		..	124	139	154	169	184	204	..	..
" 39		..	144	164	184	204	224	..	..	..
" 40		..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	56
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.116	..	45	38	33	32	31	29	28	29	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..	..
24.	.022.187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb. ...	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4 per cent.	to No.	19,	B. & S.	Gauge, inclusive	$0.60
6 "	"	19,	"	" "	.70
9 "	"	19,	"	" "	.85
12 "	"	19,	"	" "	1.00
15 "	"	19	"	" "	1.15
16 "	"	19,	"	" "	1.20
18 "	"	19,	"	" "	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quality and market conditions. No fixed quotations can be given as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. above the price of bullion.